Coal Age

MAY, 1954

A McGRAW-HILL PUBLICATION — PRICE 50¢

Cutting Cost With Safety

Better safety saves money and boosts efficiency, as well as reducing accidents. p 70

Proven by Success

Orient No. 3's production line, p 76. Sunnyhill makes money do a job, p 84. Hudson Coal improves hoisting. p 100

Full Contents on Page 5

Nothing stops Mine Cars!

A few seconds to shunt a damaged car to a siding and you're back in business. Nothing can beat it... for dependability, for value, for convenience. A.C.F. Drop Bottom Mine Cars are specially designed to unload as quickly as a ton a second. The simplicity of the design is, in itself, a saving. Your own men can always handle repairs on the spot. No waiting! No extra expense! Why settle for less? A.C.F. Mine Cars are also the most economical mine transportation you can buy... the most flexible too! Your A.C.F. Representative will be glad to give you all the facts! American Car and Foundry Company, New York

Chicago • St. Louis • Cleveland • Philadelphia

Huntington, W. Va. • San Francisco • Washington • Berwick, Pa.

A.C.F.

MINE CARS *for Constant Haulage*

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Main slope belt of U. S. Steel's Robena Mine.

B. F. Goodrich cord belt moves 25 million tons in 8 years

EVERY hour that conveyor belt can take 2800 tons of run-of-mine coal from car dump to screen house. It must climb an 18 degree incline, and travel 600 feet a minute. A B. F. Goodrich *cord* belt was selected for this job because engineers knew no ordinary belt could handle the high lift, long centers, heavy loads.

Unlike the usual conveyor belt, made of rubber and layers of fabric, the B. F. Goodrich belt is made with separate cords, each surrounded by rubber, running the length of the belt. The cords make the belt stronger without making it stiff, so it can run up steep angles and still keep its U-shape to prevent spilling.

Installed in 1946, the cord belt shown here has hauled more than 25 million tons, and is expected to last years longer. Another cord belt used by this coal company is still at work after 12 years and 29 million tons. And still another carried a record-breaking 43 million tons.

Natural troughing is just one of the reasons B. F. Goodrich cord belts last longer, and so cut coal-handling costs. Other construction features provide high impact resistance and double protection against mildew.

B. F. Goodrich has a complete line of conveyor belts for the coal industry. So no matter what type or size of coal you have to move, there's a B. F. Goodrich Caricoal belt that can do it better, for less. Let your BFG distributor give you full details, or write *The B. F. Goodrich Company, Dept. M-233, Akron 18, O.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

"What's in a Name?"

Maybe "a rose by any other name *would* smell as sweet" . . . but the FACT of the matter is that today, if you want a rose (or any other specific thing) you've got to demand it by NAME—or you're in for a disappointment.

For instance, you want the highest quality lubricant, made specifically for and used solely on coal mining equipment. You won't get it by just asking for something to lubricate mining machinery. You've got to buy it by NAME—the one name that exactly identifies it—HULBURT.

HULBURT OIL & GREASE COMPANY

Specialists in Coal Mine Lubrication

PHILADELPHIA, PA.

asked W. Shakespeare

ANSWER:

Plenty—

WHEN THE NAME IS

Hulburt

QUALITY LUBRICANTS

Yes—HULBURT is the name to remember when you want lubrication service that keeps coal mining machines moving. For behind the name HULBURT are years of specialized experience, not only in producing one specialized product for one special use, but going right down into the mine and showing you how to use it to solve lubrication problems.

WHEN you lubricate wheels with *Texaco Olympian Grease,* mine cars start easier — *winter as well as summer* — and your locomotives can pull longer trains . . . move more tonnage.

Texaco Olympian Grease comes in three consistencies to meet every requirement of plain, cavity hub or anti-friction bearings. *Texaco Olympian Grease* stays in the bearings . . . gives longer lasting protection against dirt, moisture and wear . . . reduces maintenance costs. It has high oxidation resistance and will not separate in storage or in use.

For high speed ball and roller bearings in locomotives, cutters and other equipment, use *Texaco Regal Starfak.* It stays in the bearings longer . . . outperforms ordinary greases throughout a wide temperature range.

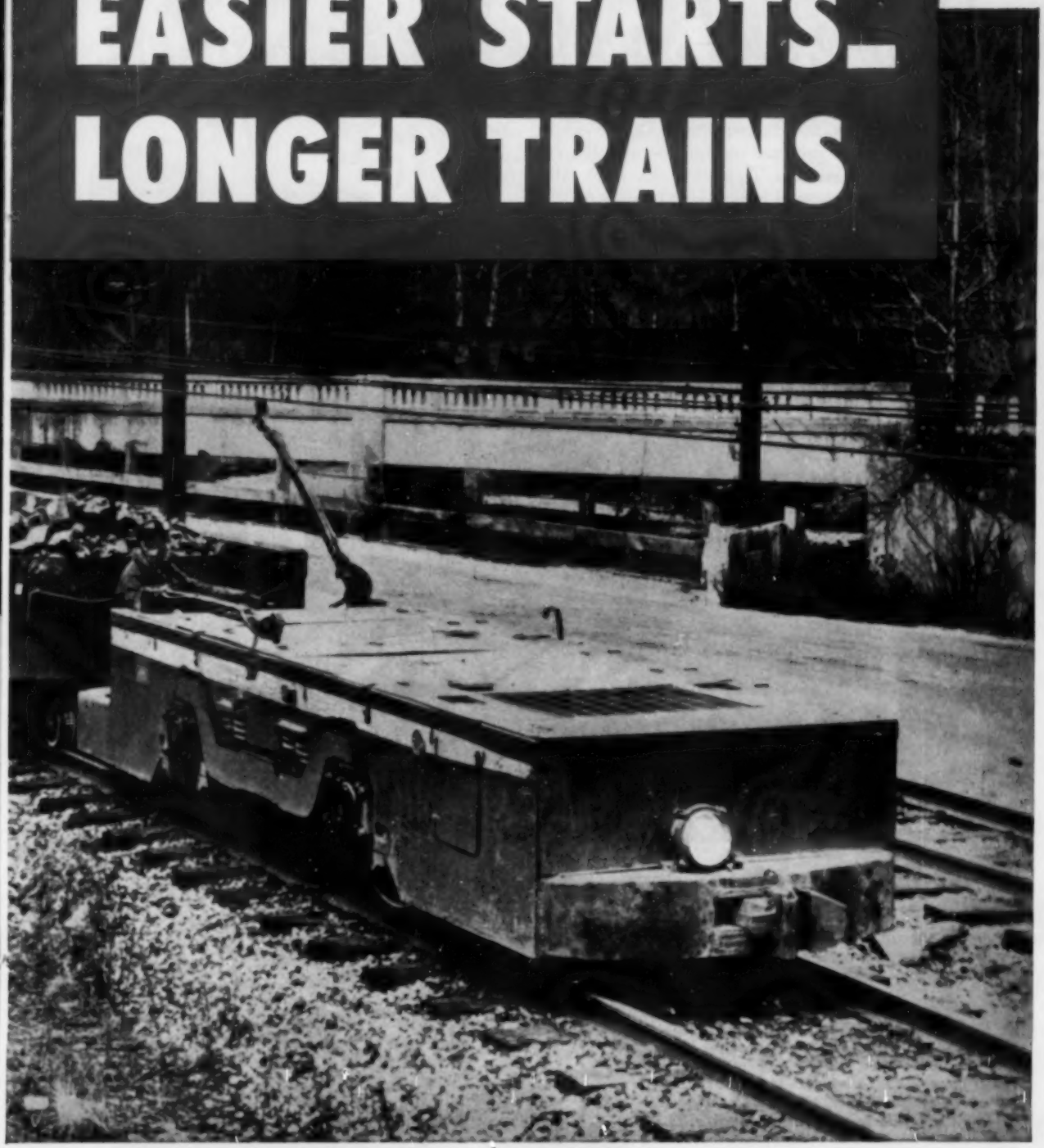
A Texaco Lubrication Engineer will gladly show you many ways to increase efficiency and reduce costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO

EASIER STARTS_ LONGER TRAINS

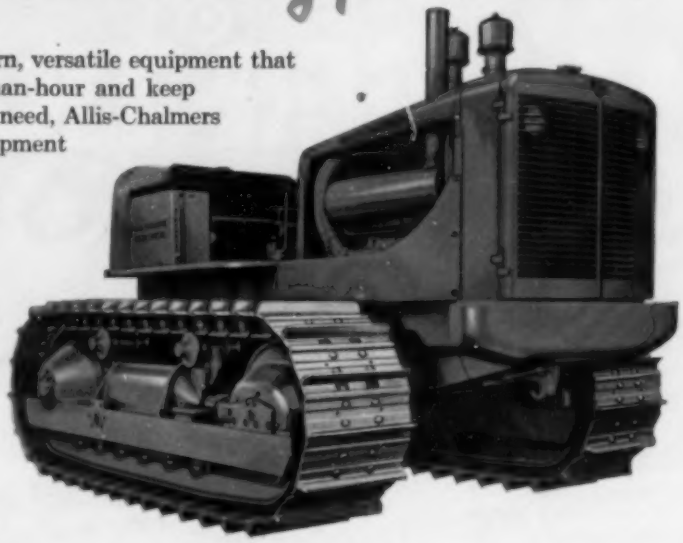


LUBRICANTS for the Coal Mining Industry

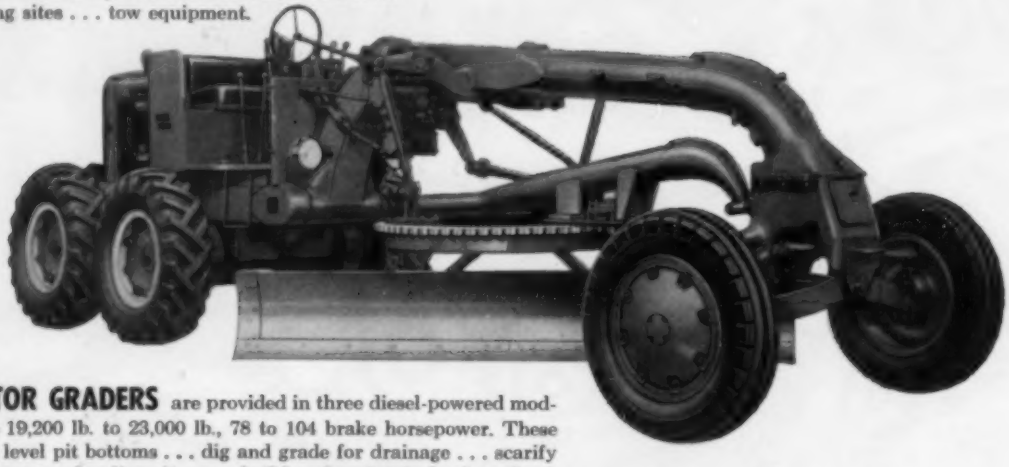
HOW 6 BASIC ALLIS-CHALMERS MACHINES

mechanize and speed mining production

In today's competitive era, mining requires modern, versatile equipment that enables mine operators to increase output per man-hour and keep maintenance time to a minimum. To answer this need, Allis-Chalmers provides a line of newly designed heavy-duty equipment — 6 basic machines that mechanize and speed material moving and handling in many phases of mining production.



1 **CRAWLER TRACTORS.** Allis-Chalmers builds four sizes of heavy-duty diesel tractors: HD-5—10,500 lb., 40 drawbar hp.; HD-9—18,800 lb., 72 drawbar hp.; HD-15—27,850 lb., 109 drawbar hp. (hydraulic torque converter drive optional); HD-20 — 41,000 lb., 175 net engine hp. — hydraulic torque converter drive. With cable or hydraulic bulldozer blades they build access roads . . . maintain tailings dumps . . . clean up around shovels . . . cut drainage ditches . . . dig sludge basins and sluiceways . . . build reservoirs and pond dams . . . strip overburden . . . clear and level building sites . . . tow equipment.



2 **MOTOR GRADERS** are provided in three diesel-powered models — 19,200 lb. to 23,000 lb., 78 to 104 brake horsepower. These units level pit bottoms . . . dig and grade for drainage . . . scarify . . . prepare dragline sites . . . build and maintain haul roads. A gasoline-powered Model D Grader is also available. It handles routine road maintenance and light construction.

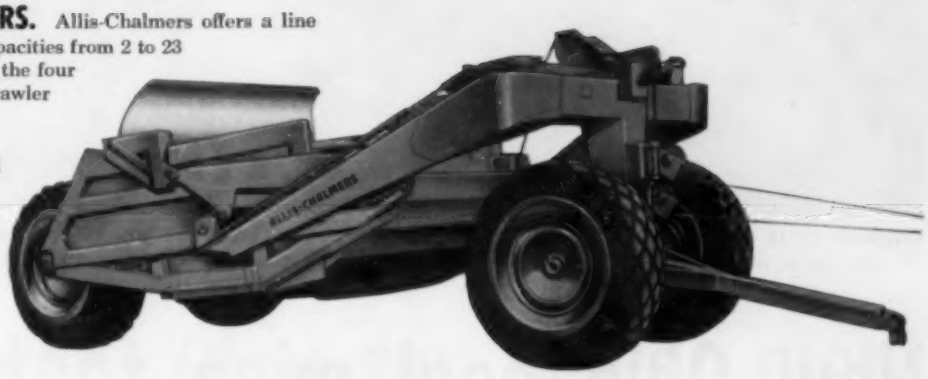
3 **TRACTOR SHOVELS** are available for all four sizes of Allis-Chalmers tractors. Standard bucket sizes range from one to four cubic yards —light materials up to seven cubic yards. These machines handle ore, tailings, coal and other bulk materials . . . clean up around shovels and hoppers and conveyors. Underground they load hauling units and excavate to reach new ore. Units are hydraulically controlled.

4

MOTOR SCRAPERS. The 18-yard (heaped) diesel-powered TS-300 Motor Scraper strips overburden, loads, hauls material from open pit . . . clears and levels for campsites and drill setups . . . levels and grades for access roads, building sites . . . hauls in supplies. A smaller 13-yard (heaped) TS-200 Motor Scraper is also available.

5

PULL-TYPE SCRAPERS. Allis-Chalmers offers a line of seven scrapers with capacities from 2 to 23 cubic yards. Matched to the four sizes of Allis-Chalmers crawler tractors, these tractor-scraper teams load and haul ore-bearing material . . . handle large-scale stripping jobs.



6

ROCK WAGON. The TR-200 Motor Wagon hauls tailings, sand, gravel, overburden and ore. Unit travels fast "off-road" with capacity loads . . . dumps clean every time with 18-ton hydraulically controlled rear-dump body. Double layer steel bottom with oak plank filler absorbs rock shock of overhead loading. A 22-ton bottom-dump Motor Wagon also available.

Write for catalogs or get the complete facts from your nearby Allis-Chalmers dealer.

ALLIS-CHALMERS

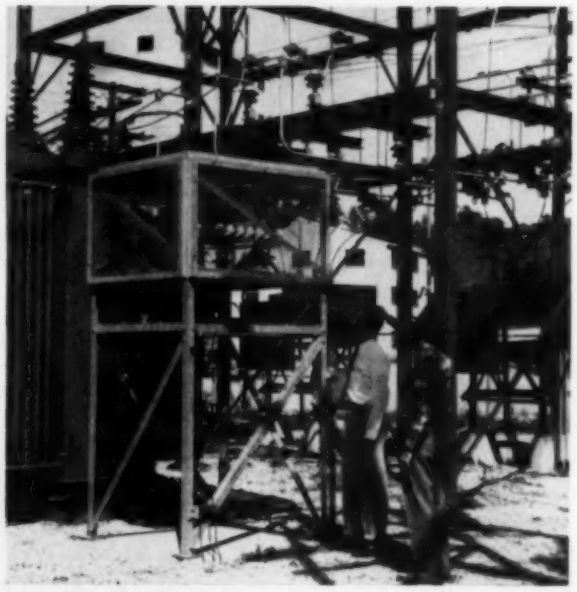
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

ENGINEERING REPORTS:

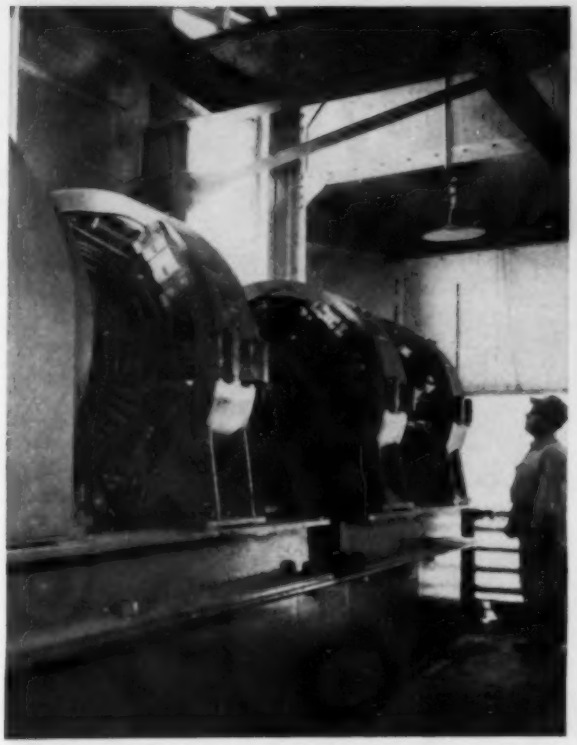
MINIMUM CYCLE TIME on this huge shovel—bucket capacity, 45 cubic yards—and other three shovels at mine is accomplished with help of pin-point control of G-E amplidyne system. Dependable G-E motors and motor-generator sets power shovels.

New Ohio coal mine to produce

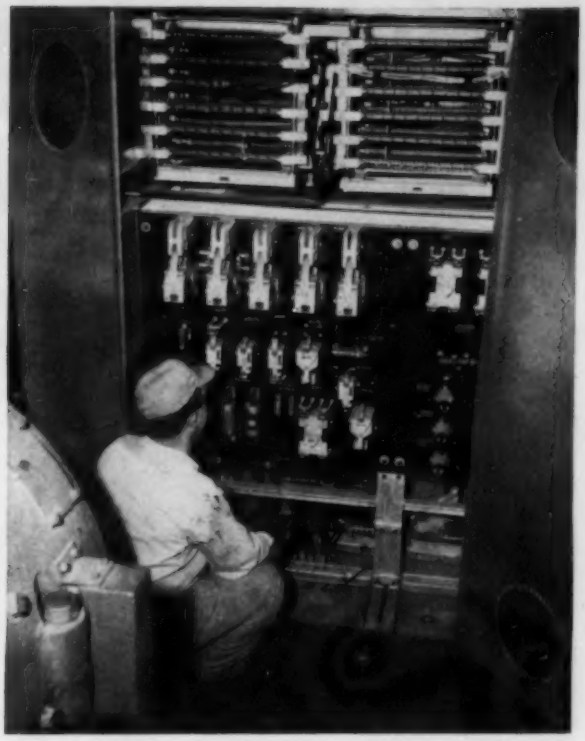
ON-THE-SPOT CONTROL OF ENTIRE MINING OPERATION is provided by G-E 2-way radio system from Zanesville headquarters, 48 miles away. Result: outage time is kept low.



MINIMUM POWER LOSSES with this G-E substation which is located near work area. Neutral grounding assures minimum shutdown, maximum protection for personnel and equipment.



ROUND-THE-CLOCK SHOVEL OPERATION—thanks to this five-unit G-E motor-generator set. Split frames of m-g sets, specially designed for shovels, assure ease of maintenance.



INSTANTANEOUS CONTROL of shovels' hoist, swing and crowd motors provided by G-E amplidyne control. System uses fewer components, guards against torque peaks.

5,000 tons/day for power plant

General Electric equipment to help Muskingum mine reach peak output

The new Muskingum Mine, Morgan County, Ohio, soon will be furnishing 5000 tons of strip-mined coal per day to the Ohio Power Company's nearby Muskingum River Plant. In a continuous stream, the coal flows from the mine through the preparation plant, and then to the power station.

Four shovels—all powered and controlled by G-E equipment—are used at this mine. Two of them—one with a bucket capacity of 45 cubic yards—will handle the overburden to a projected highwall of 80 feet. The two smaller shovels load the coal. A G-E equipped substation provides power for the shovel operation.

To integrate the mining, processing production, the mine's Zanesville headquarters—48 miles away—uses a G-E two-way radio system. Eight units are located in the shovels, dispatch cars, and mine office.

You can take advantage of the same expert G-E electrical engineering that went into this system, no matter how large or small your mining project may be. When you specify General Electric, its many specialized services—product development, system engineering, field engineering, to name but a few—are available to you. Your local G-E Apparatus Sales Representative can tell you more. General Electric Co., Schenectady 5, New York. 665-40

Engineered Electrical Systems for Coal Mines

GENERAL ELECTRIC

For fast, sure welding

7 Points of uniform goodness in YOUNGSTOWN PIPE

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness

●This man is position-welding an expansion joint in a steam line. Only good steel pipe like Youngstown takes this type of weld easily. That's because top-grade steel bonds better and faster. Depend on Youngstown and you're hours of labor ahead.

Youngstown

QUALITY · YOUNGSTOWN · SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

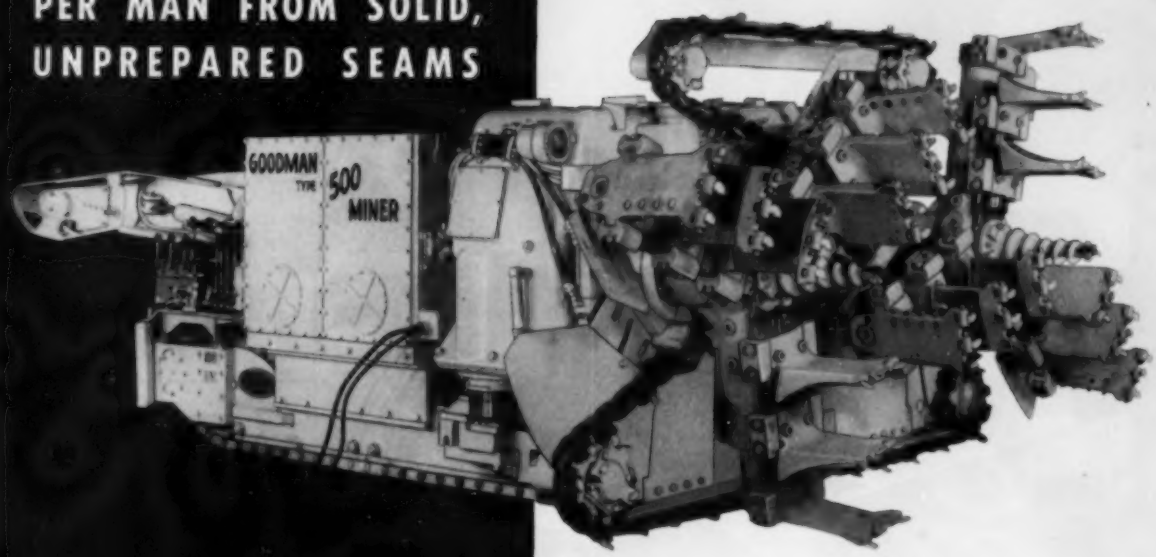
SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

GOODMAN DOES IT...

AT LOWEST COST THE GOODMAN TYPE 500 MINER

EXTRACTS HIGHEST TONNAGE PER MAN FROM SOLID, UNPREPARED SEAMS

builds a continuous mining and loading machine that has mining men everywhere talking!



A big, rugged, boring type machine that combines ease of maneuvering and capacity for all development and full production work in any mining system

- more tons per man than with any other type of underground mining equipment
- true concentrated working areas requiring fewer man hours and less supervision
- substantial reduction in costs of installation, maintenance and extension of roadways, ventilation, drainage, roof support and power lines

OUTSTANDING FEATURES

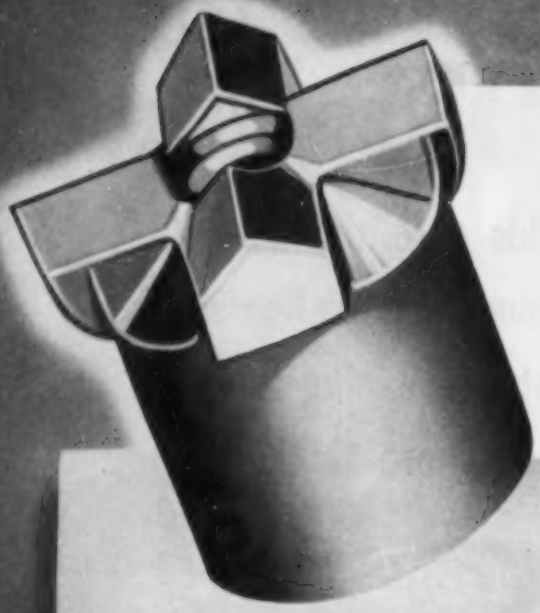
- cuts and loads up to 7 tons per minute
- advances continuously, cutting a 13-foot wide, 7-foot high path without swing or maneuver
- crosscuts can be turned at 90° angles; seam irregularities can be followed by vertical or sideways tilt of cutting unit
- produces high percentage of coarse coal, low percentage of fines
- retraction of cutting units provides tramming clearances at top, sides and bottom

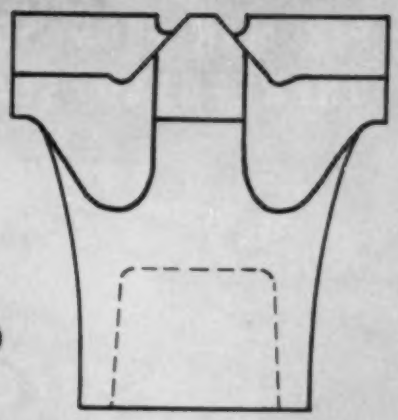
Goodman boring type miners have been designed for both low and high seams.

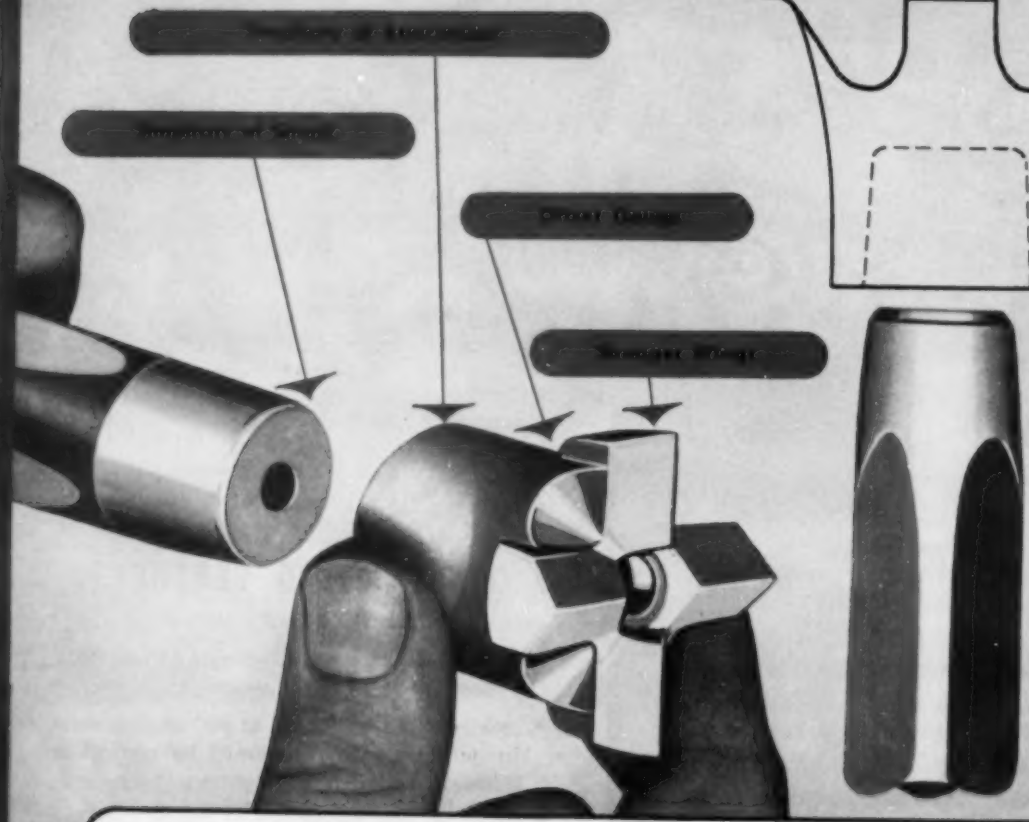
Goodman
MANUFACTURING COMPANY
Halsted Street and 48th Place • Chicago 9, Illinois

Cutting Machines · Conveyors · Loaders · Shuttle Cars · Locomotives · Continuous Miners

Here's another







The union of the bit and the rod after drilling has a cohesive strength of several tons . . . A sharp blow of sufficient weight on the end of the bit skirt will serve to detach the bit from the rod.

SPECIFICATIONS

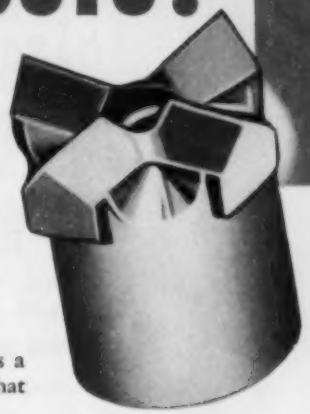
Mines everywhere cut drilling costs with CRD DETACHABLE DRILL BITS • 4 - Wing Type - Center Hole - Side Hole

Class "A" Bits For class "A" drill steel connection on any steel. Best suited to ⅞" steel.	1-1/4	Aluminum	**Class "B" Bits** For class "B" drill steel connection on any steel. Best suited to 1", 1⅛" and 1-¼" steel.	1-7/16	Orange
	1-5/16	Pink		1-1/2	Green
	1-3/8	Deep Green		1-9/16	Yellow
	1-7/16	Brown		1-5/8	White
	1-1/2	Grey		1-11/16	Black
	1-9/16	Maroon		1-3/4	Red
	1-5/8	Deep Blue		1-13/16	Blue
				1-7/8	Tan
				1-15/16	Plain
				2	Pink
				2-1/8	Maroon
				2-1/4	Aluminum

Cans are labeled showing size of steel socket, gauge of bit, and color.

way to cut drilling costs!

Use Le Roi-CLEVELAND one-use CRD Detachable Bits



Lower cost per foot of hole — that's the goal of everyone who has rock to drill. And that was the goal of Le Roi-CLEVELAND engineers, too. They didn't fool around with the problem either. Fifty years of experience in designing rock drills was put to work. The result — a one-use detachable bit that can save you money in a wide variety of applications.

This designing job wasn't done overnight. You can't produce the results our engineers were after in such a short time. Instead, these bits were put to work—and, for a number of years they have helped reduce drilling costs materially in mines, in quarries, and on construction jobs.

That's why we offer them to you now — with complete confidence in their ability to help you improve your rock-drilling cost picture.

These Features Mean Lower Drilling Costs for You

Faster Drilling Speed — Special offset gauge feature, which permits the use of thinner wings and a steeper reaming angle, greatly reduces binding and provides ample clearance for cuttings. Result is a free, fast-cutting chiseling action that gives you greater drilling speed.

Less Drill-Steel Breakage — The method of attachment used with the CRD bit eliminates threads on the drill rod. Since a drill rod is only as strong as the root diameters of its threads, the tapered threadless CRD design provides longer drill-steel life — reduces drill-steel handling and reconditioning costs.

Lower Rock Drill Repair Costs — Because the CRD bit design reduces binding in the hole, there is less strain on the rotation parts of your rock drills. Rifle bars, rifle nuts, and chucks last longer. You get more drilling done at lower cost.

Since no special equipment is needed to thread rods, you owe it to yourself to try a can of CRD bits. They're ideal for roof bolting and for use in your stopes as well as in your headings. A short trial will give you first hand information on the ability of these bits to cut drilling costs in your property as they have in so many others.

Bulletin RD-29 gives detailed information. A copy is yours for the asking — just write for it. RD-58

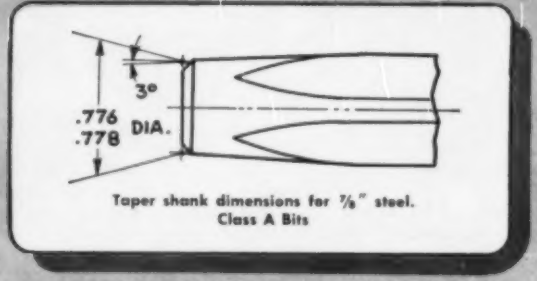
CLEVELAND ROCK DRILL DIVISION

Le Roi Company

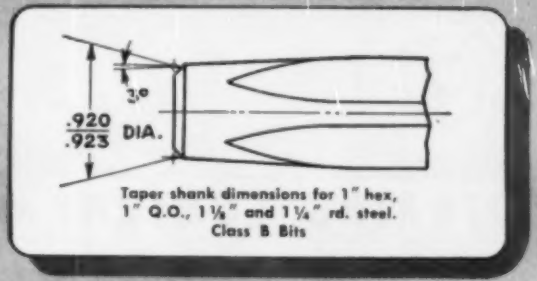
A Subsidiary of Westinghouse Air Brake Co.

12500 BEREA ROAD • CLEVELAND 11, OHIO

Plants: Milwaukee, Wis. • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Mich

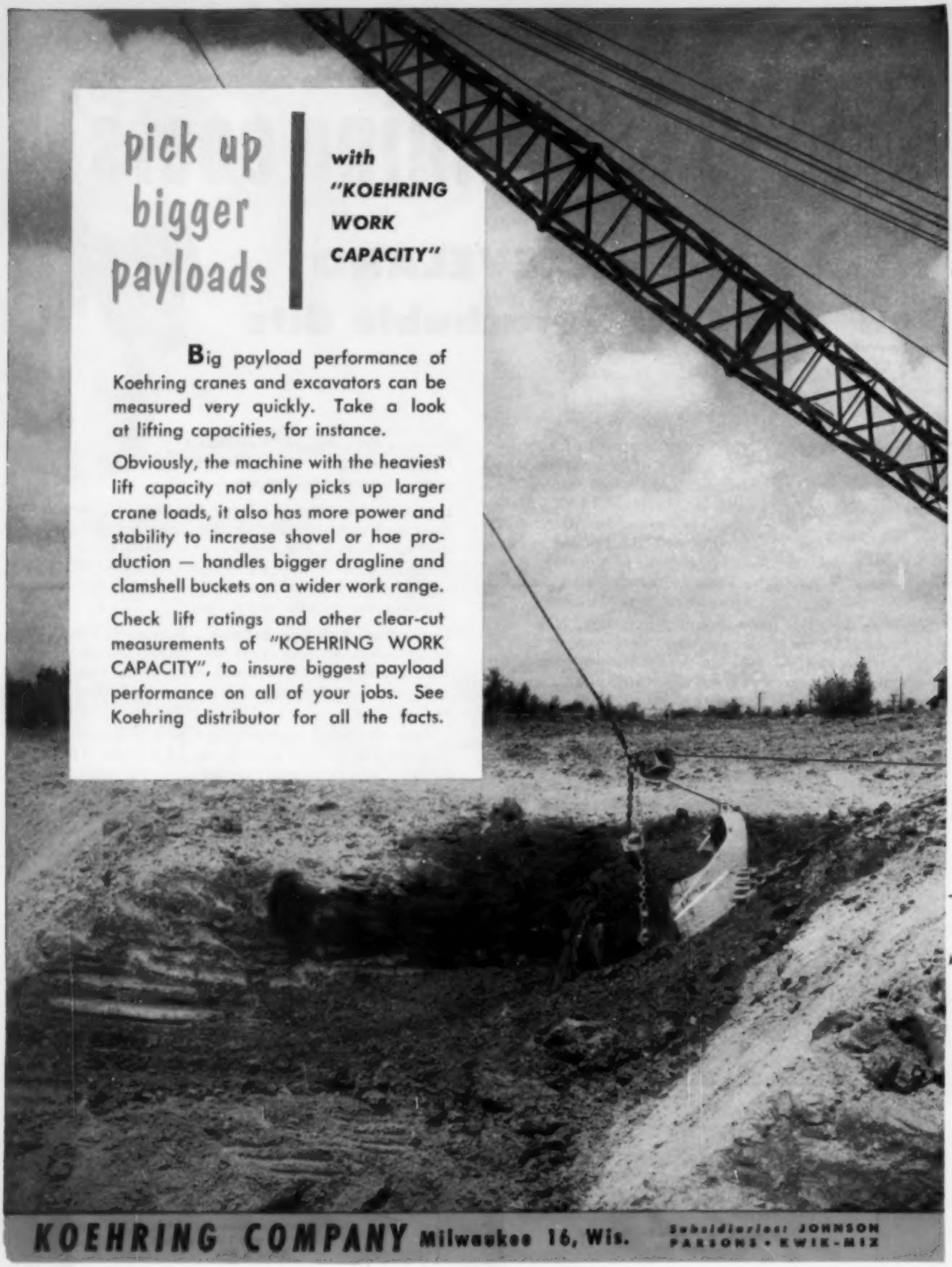


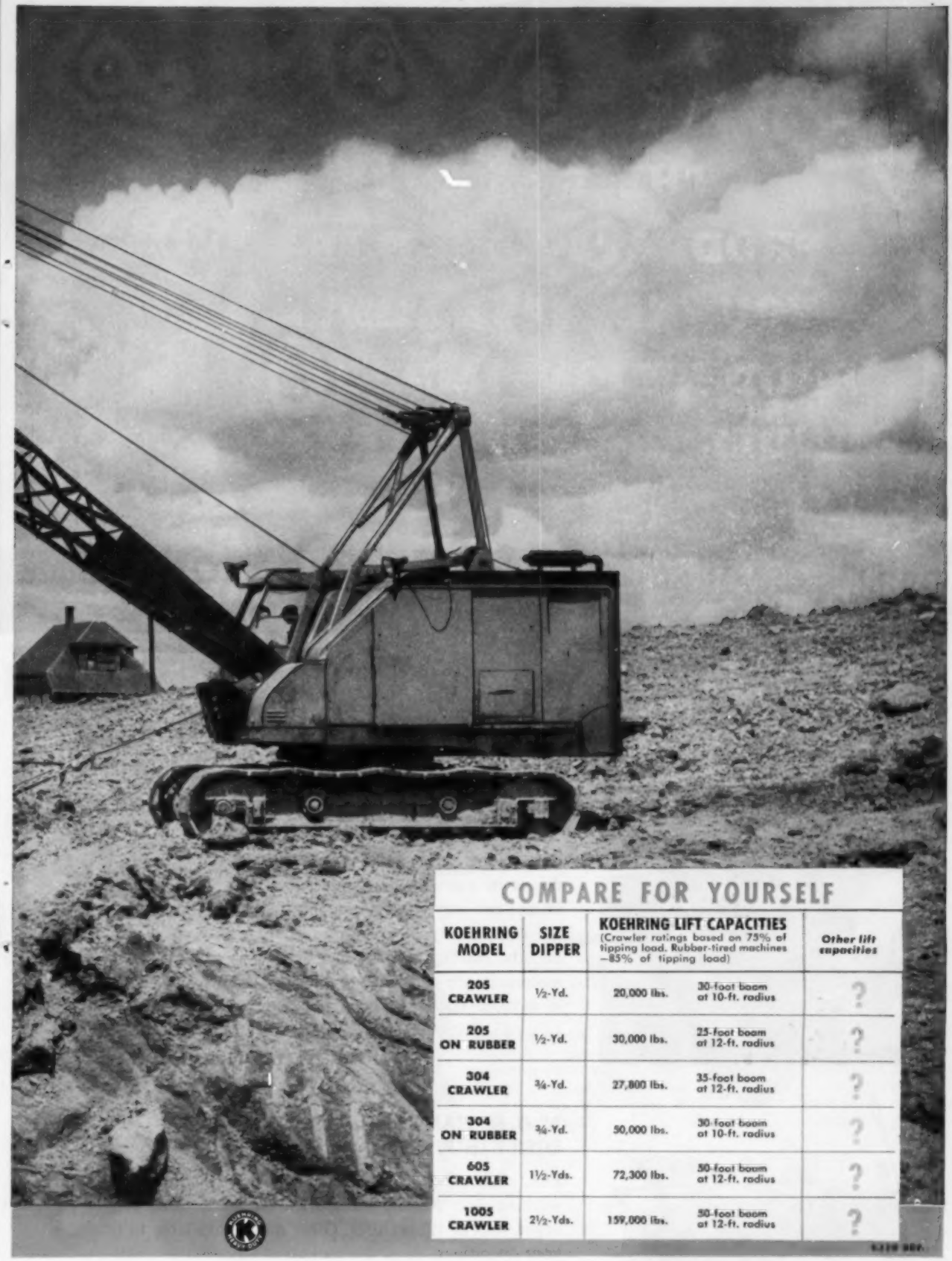
Taper shank dimensions for ⅞" steel.
Class A Bits



Taper shank dimensions for 1" hex, 1" Q.O., 1⅛" and 1¼" rd. steel.
Class B Bits

The taper attachment shank used with the CRD bit is easy to make. You need no dies or other expensive threading equipment. Several simple, low-cost methods can be used for preparation — grinding, forging or machining.


pick up bigger payloads
with "KOEHRING WORK CAPACITY"
Big payload performance of Koehring cranes and excavators can be measured very quickly. Take a look at lifting capacities, for instance.
Obviously, the machine with the heaviest lift capacity not only picks up larger crane loads, it also has more power and stability to increase shovel or hoe production — handles bigger dragline and clamshell buckets on a wider work range.
Check lift ratings and other clear-cut measurements of "KOEHRING WORK CAPACITY", to insure biggest payload performance on all of your jobs. See Koehring distributor for all the facts.
KOEHRING COMPANY Milwaukee 16, Wis.
Subsidiaries: JOHNSON PARSONS • KWIK-MIX



COMPARE FOR YOURSELF

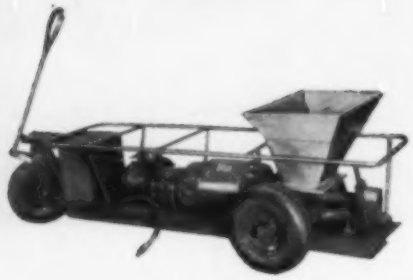
KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines —85% of tipping load)		Other lift capacities
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?

THESE M·S·A PRODUCTS CAN HELP YOU INCREASE MINE PRODUCTION—IMPROVE UNDERGROUND SAFETY!

...SEE THEM, AND MANY OTHERS

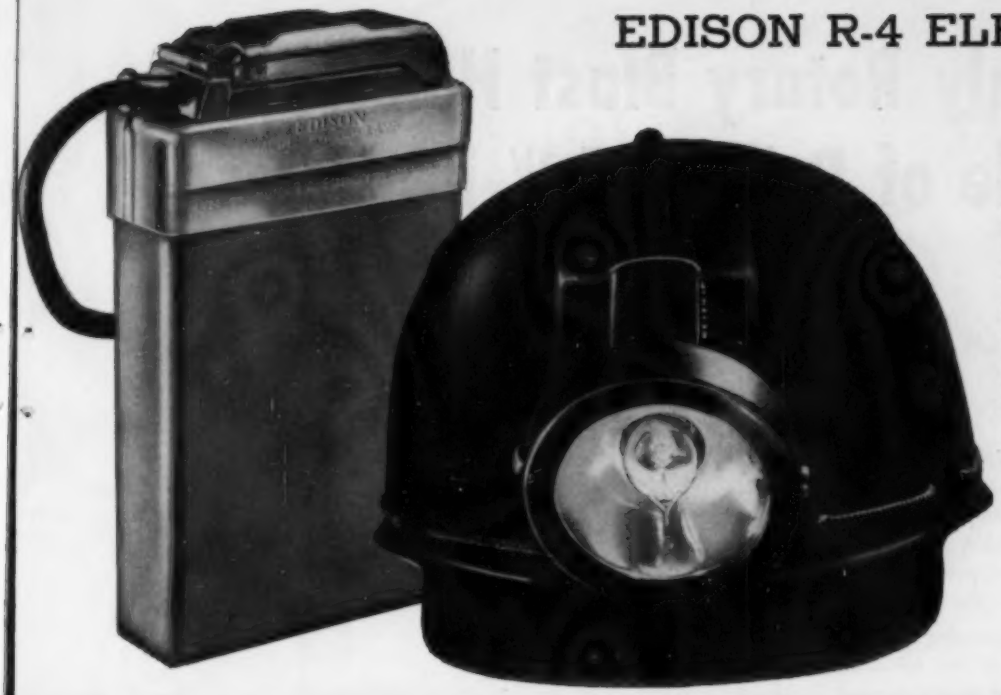
M. S. A. MINEPHONE

The M.S.A. MinePhone is eliminating communication delays in many modern mines everywhere. This clear, instant two-way voice communication system coordinates the wide variety of operations vital to economical production. Haulage moves faster because dispatcher and all motormen are constantly in touch, even while trips are in motion. The MinePhone brings an added measure of safety to all operations.



M. S. A. BANTAM ROCK DUST DISTRIBUTOR

Fast, economical distribution of rock dust right up to the working face. Readily transported on shuttle cars, conveyor belts or rubber tires. Other models available to fit your operations.



EDISON R-4 ELECTRIC CAP LAMP

Its brilliant, unfailing beam gives miners the light they need to operate mechanized equipment at its greatest capacity, safely. Designed and built for rugged underground service, the dependable Edison R-4 Cap Lamp stays on the job, shift-after-shift, for years.

AT M·S·A BOOTHS NO. E-1, 2, 3, BLUEFIELD COAL SHOW

M.S.A. METHANE RECORDER

Continuous detection and recording of methane concentrations in mine air. Immediately indicates unusual gas conditions from any cause. Provides guide for regulating air volume for proper and economical ventilation.

M.S.A. METHANE ALARM

For accurate, continuous sampling of air in working areas. Flashing red light warns of methane concentrations. Completely portable—also available with shock-mounting for use on machinery.

M.S.A.-WOLF JUNIOR FLAME SAFETY LAMP

Dependable steady flame, guarded from drafts by improved ventilation and specially designed openings. Easy-to-read chimney. 70% of parts interchangeable with standard size model.

M.S.A. CHEMOX®

Provides complete breathing protection in any atmosphere for a minimum of 45 minutes. Chemox generates its own oxygen from replaceable chemical canister. Weighs only 13½ lbs. Comfortable in service. U.S. Bureau of Mines Approved.

M.S.A. SELF-RESCUER

For immediate breathing protection in emergencies caused by fire or explosion. Vital to the miner while traveling through carbon monoxide to fresh air. Available in convenient cache assemblies for storage throughout the mine, or in individual carrying cases. U.S. Bureau of Mines Approved.

M.S.A. DUSTFOE #55 RESPIRATOR

Tops in worker acceptance. Lightweight comfort; streamlined design avoids "blind spots." Filtering action provides maximum dust protection. U.S. Bureau of Mines Approved.

MINE SAFETY APPLIANCES COMPANY

201 North Braddock Avenue, Pittsburgh 8, Pa.

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Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, New Glasgow, N.S.

MSA

SAFETY EQUIPMENT HEADQUARTERS

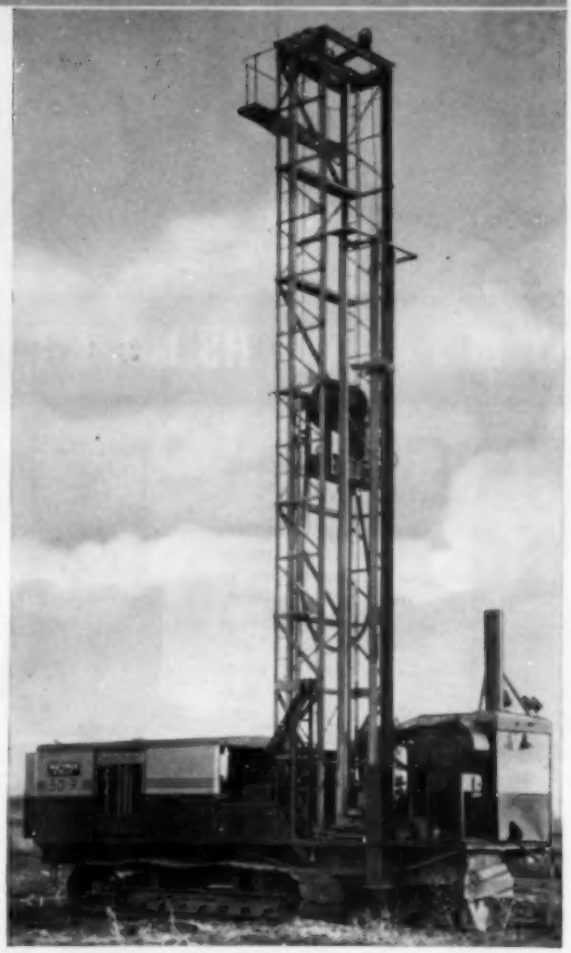
When you have a safety problem, M.S.A. is at your service. Our job is to help you.

The Only Rotary Blast Hole Drill Capable of Drilling 12¼-in. Holes

The Bucyrus-Erie 50-R

Now, you can take full advantage of the large hole drilling technique with a rotary drill too—the Bucyrus-Erie 50-R. Here's a machine, designed to drill 9⅞ to 12¼-in. holes, which has proved its ability to drill these large diameter holes in the shortest time possible.

For example, a 50-R, operating on 6¾ hour shifts in a large Indiana open pit coal mine, drilled 2,598 holes of 10⅝-in. diameter to an average depth of 42 ft. in six months. The average drilling rate was 125.1 feet per hour for a total of 844.4 feet per shift. Overburden consisted of medium hard sandstone with an overlay of hard shale.



Look Over These Important 50-R Features

1 Down pressure on the bit is hydraulically powered for maximum controlled penetration.

2 Ward Leonard electric control on rotation of drill pipe permits drilling at most efficient speed for a given formation.

3 Drills continuously for 32'-8" before an additional drill pipe section is added.

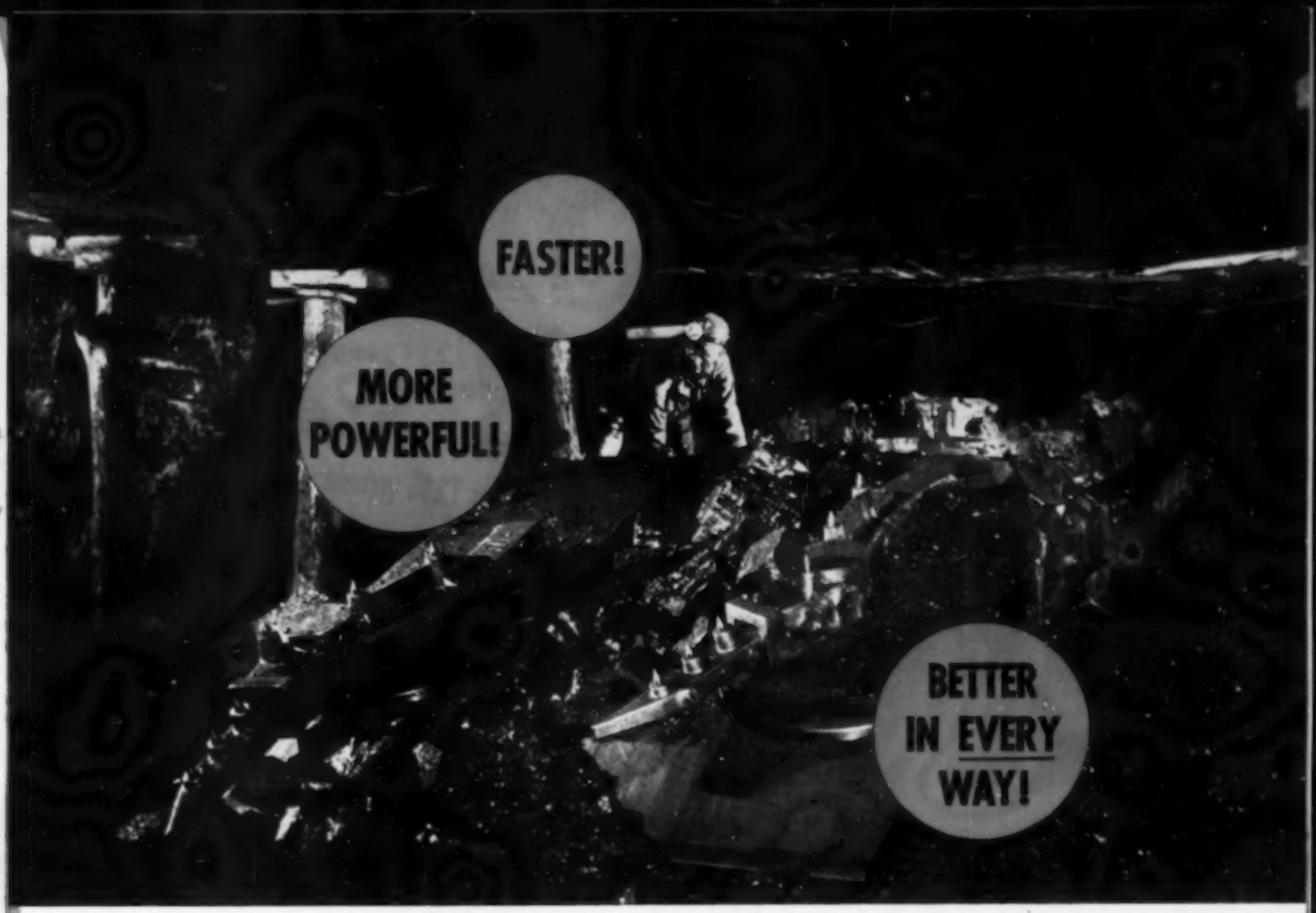
4 Drill pipe sections are added or removed in a few minutes with a remote-controlled, power-driven tool handling unit. No heavy manual labor is involved.

5 Cuttings are removed from the hole as drilling progresses by two 640-cfm air compressors. *Only the "fines"* are picked up and handled by the Roto-Clone precipitator. "Heavies" pile up adjacent to the drill hole for use as stemming material. 2854

There are many more reasons why the 50-R is the finest rotary blast hole drill ever built. Write for complete information today on how the 50-R can save you money in your mine or quarry.

BUCYRUS ERIE

South Milwaukee, Wisconsin



JOY SUPER 14-BU LOADER

Performance—coupled with unrivaled simplicity of design and durability in service—made the 14-BU the world's most widely used loader in medium-low coal. Now, in the SUPER 14-BU, performance has been stepped up even higher . . . the machine can get in and out faster, load more coal and stay on the job better than ever before.

For example, horsepower is increased from 40 to 65 HP. Peak loading capacity is stepped up 20%, and the high tramming speed almost 50%. All mechanical and electrical components have been beefed up to match the oversize horsepower motor, and reduce maintenance costs. The conveyor chain speed is increased to more than 300 FPM—up about 30%—and the chain itself has 45% greater tensile strength. The loader actually weighs about 900 lbs. more, but heights are unchanged at 30½", 33" and 36".

Add extra advantages like those to Joy's famous gathering mechanism and exclusive Magnetax control—features that have been field-proved in every coal mining area in the world—and you have the kind of easy-operating, heavy duty, high production loader that means increased tonnage and reduced costs for you. ● Let us show you what SUPER 14-BU Loaders or other Joy Mechanized Equipment can do to improve your profit margin! ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

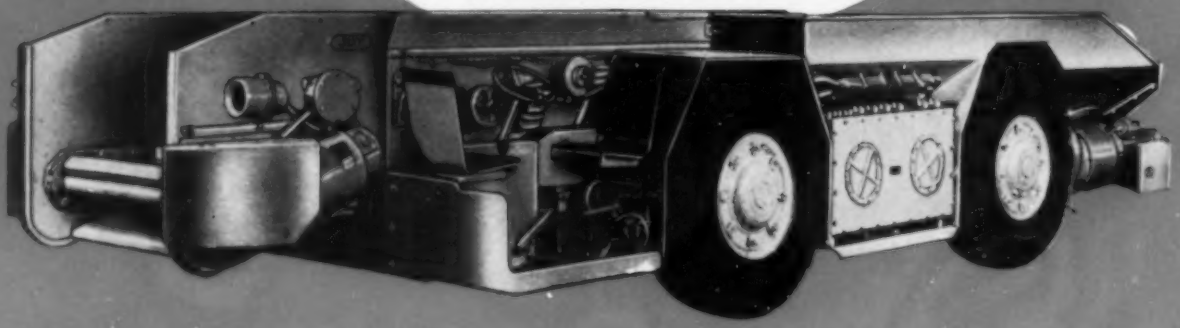
Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

THE JOY 10-SC SHUTTLE CAR...

★ Won't slap on bumps
★ Won't skid on grade turns
★ Gets out of bad spots with ease
★ Readily trams up a 12% grade



The improved Joy 10-SC Shuttle Car is available as a Permissible or Non-Permissible unit, for net payload capacities up to 10 tons. It is built in 43", 48" or 54" heights (machine only) and may be equipped with 4", 6" or 8" sideboards. Tramming speed loaded is approximately 4.2 m.p.h., and the unit is equipped with Joy-pioneered hydraulic cable reel, and hydraulically adjustable elevating discharge.

CAN MAKE MONEY FOR YOU!

It gets from the Face

to the

Discharge

Point and back again

faster than any

other car on the market

This latest model 10-SC is away out in front—more than ever before the world's leading shuttle car for heavy-duty, high-production service. Particularly ideal for full-seam mining because it can handle full loads of coal or rock with equal ease, the 10-SC Shuttle Car is now capable of new potentials in productivity, maneuverability, and dependable performance with lowest maintenance.

MORE ROUND TRIPS PER SHIFT

This improved shuttle car can travel, discharge and return faster than any other car in its class. That means more pay-loads per shift—and it may also mean more efficient use of other equipment, such as Continuous Miners, Loaders, Belt Conveyors, etc.

15 HP traction motors of new design provide more dependability and more reserve power for increased speed, maneuverability and carrying capacity. Wheel units and brakes are of over-capacity size for continuous heavy-duty service, and the gearing and frame are also over-capacity. Higher speed conveyor discharge, with higher-HP motors, actually gets discharge time down to three-quarters or half the time formerly required.

OTHER JOY-PIONEERED FEATURES

As in previous models, the 10-SC has 4-wheel positive steering, 4-wheel drive and 4-wheel brakes. The hydraulic "power steering" innovation in the automotive world has been a standard patented feature of Joy Shuttle Cars for years . . . one of the reasons for their high maneuverability.

The 10-SC's smooth, grab-free disc-type brakes (the type widely used on aircraft) were also pioneered by Joy for underground use. They provide exceptional stopping power with extreme simplicity and low maintenance . . . ideal for mining use because they're unaffected by dirt, coal dust, oil or water.

Other features of the new 10-SC include: improved arrangement of operator's controls for fool-proof driving; improved "zone" lubrication for fast, easy servicing; the famous Joy "Magnetax" controls, etc.

● For full data, address ***Joy Manufacturing Company, Oliver Bldg., Pittsburgh 22, Pa. In Canada:*** *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

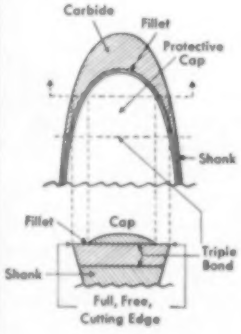
JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

W&D CL45859

Here's more FIELD-PROOF on JOY SULMET BITS

WHY SULMET CARBIDE COAL CUTTER BITS ARE BETTER



- **Positive Rake Angle**—cuts without dragging, scraping or crushing
- **Tungsten Carbide Tip**—hardest substance made
- **Protective Cap**—centered on carbide; locks tip to combat shear loads
- **Triple Surface Tip Support**—back, top and bottom of tip are in firm contact with slot
- **Triple Bond**—bond metal anchors tip at all points of contact
- **Strengthening Fillet**—protects against side stress; helps to hold lost tips to a minimum
- **Full Cutting Action**—all cutting edges are free; no flush shank metal

★ Complete Cutting Cycle (Sump and Shear) every 15½ seconds!

★ 16 Regrinds per bit!

Mine: **Lewiston Seam, West Virginia**
Cutting Conditions: **General, with occasional Black Jack streak in upper part of seam**
Bit Used: **Joy SULMET SMA-2 Cutter Bit, used with Joy 3-JCM Continuous Miner**

Production rate on this job is high, with a 15½-second cutting cycle. And the 16-regrinds-per-bit average means high tonnage per set of bits used . . . and low bit cost per ton.

Get the advantages of Joy SULMET Bits in your cutting operations. They can be resharpened without reducing kerf thickness . . . cut coarser coal than most bits . . . cut up to 30% faster . . . stay sharp longer . . . cut more places without bit change . . . require up to 30% less power for each place . . . create less dust. In fact, we believe they will outperform *any* other bit, tungsten carbide or steel—and they're available in a variety of types to suit any seam conditions, also in Auger Bits.

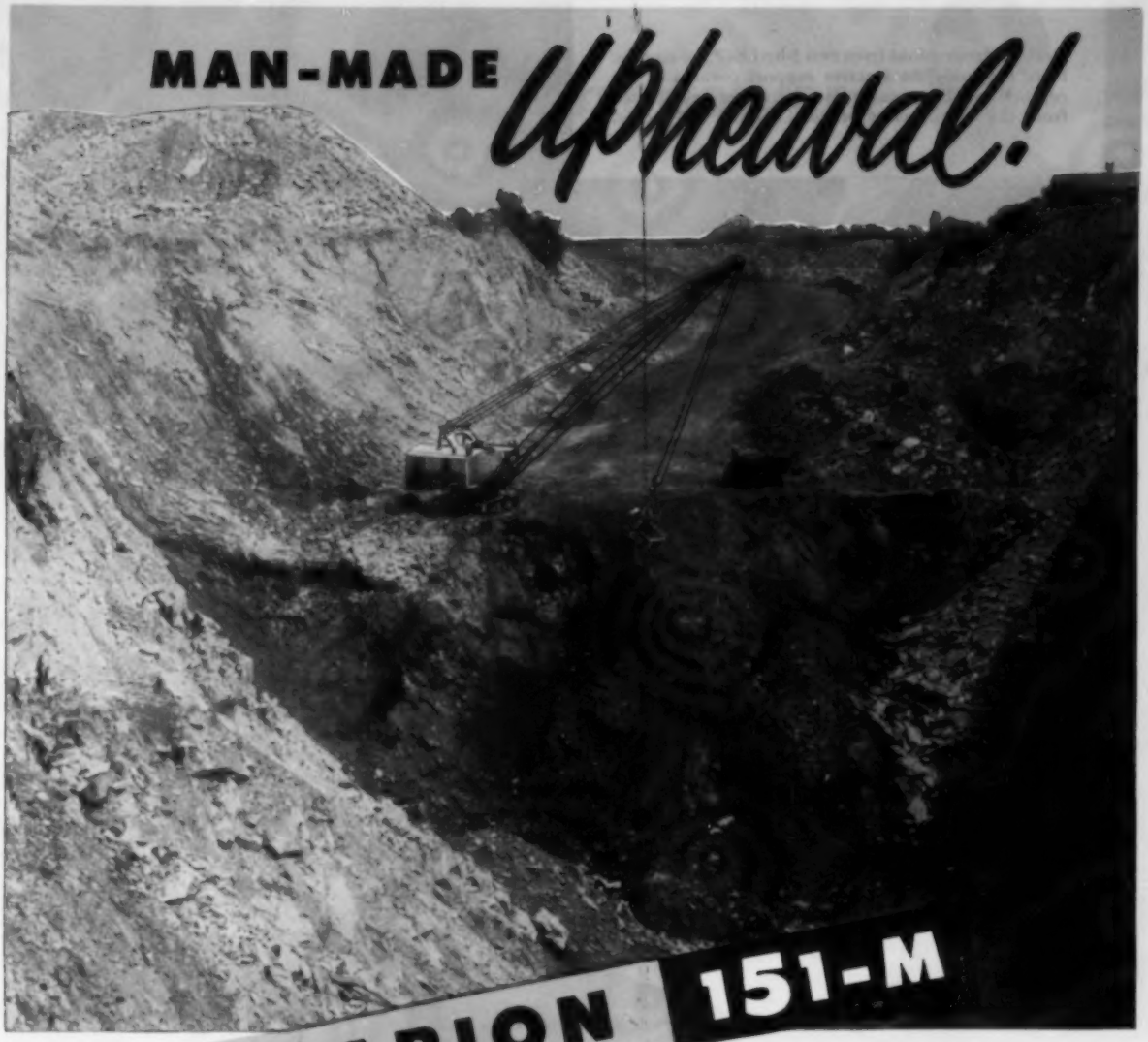
● Why not try SULMET Bits — prove their superiority for yourself? ***Joy Manufacturing Company, Oliver Bldg., Pittsburgh 22, Pa.*** *In Canada: Joy Manufacturing Co. (Canada) Ltd., Galt, Ont.*

Consult a Joy Engineer

and write for a FREE SHOWING of our Full-Color Motion Picture "JOY SULMET CARBIDE BITS"

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT



Five cubic yards—either of rock overburden or coal—are moved every time this dragline swings. It rides on a 100-foot boom that stacks the spoil high and far away.

Cycle time, on 180-degree swings, takes as little as 45 seconds.

The load may come from as far as 135 feet below grade—and be dumped as high as 65 feet above grade.

This hard-digging, fast-swinging dragline is only one of nine MARION machines used by one company to develop rich anthracite coal veins in Pennsylvania.

The man-made upheavals made by this fleet of MARION machines are impressive. So is the record of dependability and big production of the MARION equipment.

Let MARION show you what machines like the 151-M can do to meet your coal stripping and loading requirements.

MARION

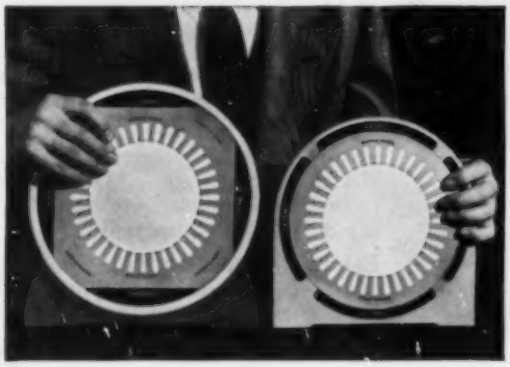
POWER SHOVEL CO.
MARION, OHIO, U. S. A.

70 YEARS OF PROGRESS

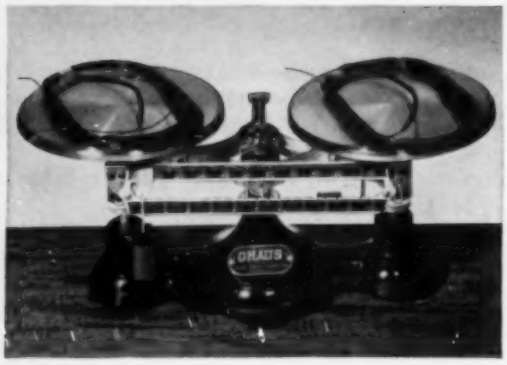
from ¾ cu. yd. to 45 cu. yd.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

Here are laminations from two 5-hp Life-Line motors. Note that only the inactive support corners of the original Life-Line square stator have been eliminated from the round stator of the Life-Line "A" motor.



When the stators are placed in their respective frames we see how the Life-Line "A" size reduction has been accomplished without sacrificing active magnetic steel. Excess air space has been eliminated also.



Copper, the other important active material, has not been sacrificed. The coil on the left is from an original Life-Line motor. The coil on the right is from a new Life-Line "A" motor. Both weigh the same.

Here's how more horsepower has been put in the Life-Line A motor

These demonstrations show how motor performance is determined by "active" material

Perhaps you are a motor user who has raised the question: "How can you shrink the size of a motor and still equal or better the original performance?" Let's look inside a motor to find the answer.

The performance of any motor is dependent upon its active material—the magnetic steel and copper. Take the original Life-Line® and the new Life-Line "A" for example. The amount of magnetic steel in the stator and rotor and the copper in the coils of both Life-Line designs are the same. The reduction in size has been accomplished by eliminating inactive material and space. Thus you have a smaller motor whose basic electrical performance remains unchanged. In fact, the Life-Line design principle has been proved in service for over seven years. J-21848

For the complete story on the new Life-Line "A" motor write for your copy of Booklet B-6154. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE...IF IT'S

Westinghouse

"Our new Dodge truck is a better deal for me and for my boss, too!"

Our new Dodge *"Job-Rated"* trucks have proved a better deal in handling ease, visibility, comfort and power. You, too, can save time and money, work and effort with these great new trucks. Find out today why Dodge means a better deal all around!

YOU GET—A Better Deal In Steering! Sharp 39° turning angle and short wheelbase design make Dodge the sharpest turning trucks on the road. That saves you *time!*

YOU GET—A Better Deal In Seeing! Big 951 sq. in. windshield of Dodge cab is largest of any popular truck. All-around visibility is tops, too, for safer driving.

YOU GET—A Better Deal In Sitting! The 16-inch-high Dodge seat is deep and comfortable enough to be in your living room! Plus easy-to-reach controls and dispatch box.

YOU GET—A Better Deal In Power! You save on maintenance because every Dodge engine . . . V-8 or Six . . . has such long-life features as exhaust valve seat inserts, chrome-plated top piston rings and positive-pressure lubrication.

New Dodge trucks give A BETTER DEAL FOR THE MAN AT THE WHEEL—and a better deal for the man who pays the bills. Test-drive and learn how a Dodge makes driving easier and does more work in less time. Give your Dodge dealer a call. He'll be glad to show you.

DODGE
"Job-Rated" TRUCKS

TUNE IN: "Break the Bank," Sunday TV—"The Roy Rogers Show," Thursday radio—"Make Room for Daddy," Tuesday TV.

COMPTON Model 48 Coal Auger

Recovers coal up to 208 ft. from the pit wall

. . . regardless of overburden

The Compton Model 48 Coal Auger is designed to give you maximum efficiency at low cost. CHECK THESE FEATURES!

1.—Auger sections racked on frame—ready for transfer to operating position by hydraulically controlled synchronized winches in a matter of seconds.

2.—Hydraulically-operated pilot pan eliminates spillage between machine and high wall.

3.—Entire unit is self-contained including elevating conveyor.

4.—Hydraulically-controlled swivelling discharge turret chute permits uniform trimming of trucks.

5.—Hydraulic jack legs (with self-leveling pontoons for better floatation) permit drilling up to 208 feet without misalignment . . . also permits drilling vertical overlapping holes for varying seam thickness.

COMPTON CUTTING HEAD

EXCLUSIVE WITH COMPTON AUGERS . . . BUILT-IN SPIDER ASSEMBLY ON NON-CLOGGING HEAD RESULTS IN INCREASED PRODUCTION BY DRILLING STRAIGHTER HOLES WITH LESS FRICTIONAL DRAG.

MODEL 48 SPECIFICATIONS

Length: 48 feet; Weight: Approx. 36 T.
Carries eight 26 feet auger sections.
Required pitwidth: 50 feet
Power: 300 HP Diesel Engine
Hydraulic frame jack lift: 66" or 120"
Auger diameters: 28" to 48"
Possible drilling depth: 208 feet

Consult a Compton Engineer for Details

Compton, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

BOX 1946 — PHONE 4-6384 CLARKSBURG, WEST VIRGINIA

Break it up to bite size...with APEX®

VERSATILE APEX explosives are an important factor in the amazing improvements in breakage now possible with the newest Atlas development . . . Alternate ROCKMASTER® combined with Alternate Velocity Loading.

Apex is an economical ammonium nitrate explosive with a patented assembly having a water-proof gelatin core that offers these advantages:

- **The water-proof core promotes complete detonation of the explosive in wet holes.**
- **Complete propagation of the column in any height face.**
- **Fluted-end cartridge permits easy loading.**
- **A wide range of strengths and velocities to choose from. Apex is available in 8 strengths: each in low, medium and high velocity.**

For maximum breakage, better control of throw and economical production, team APEX explosives with the ROCKMASTER Blasting System.

For complete information on all Atlas Explosives Products, ask your Atlas representative for a copy of the new Atlas Explosives Catalog.

ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY,
WILMINGTON 99, DELAWARE

Offices in principal cities

CHANCE PROCESS

THE ORIGINAL HEAVY-DENSITY COAL CLEANER

3-PRODUCT CHANCE CONE OFFERS ALL THESE FEATURES

- new low maintenance method of elevating refuse
- automatic refuse withdrawal
- cleans coal down to 1.35 gravity
- takes off middlings from 1.35 to 1.70 gravity
- over 99% recovery of salable coal
- cleans wide range of coal—⅛" to 10"
- one-man gravity change-over in 5 minutes
- capacities 40 tph to 600 tph

Chance Cones, in use in all the major coal producing countries of the world, are cleaning over 123,000,000 tons of coal annually. Chance Cones produce exceptionally high tonnage of specification coal at *lowest cost per ton*. Find out more about the IMPROVED Chance Cone. Write for full details today.

The new middlings take-off is optional with new equipment and can be fitted to cones already installed.

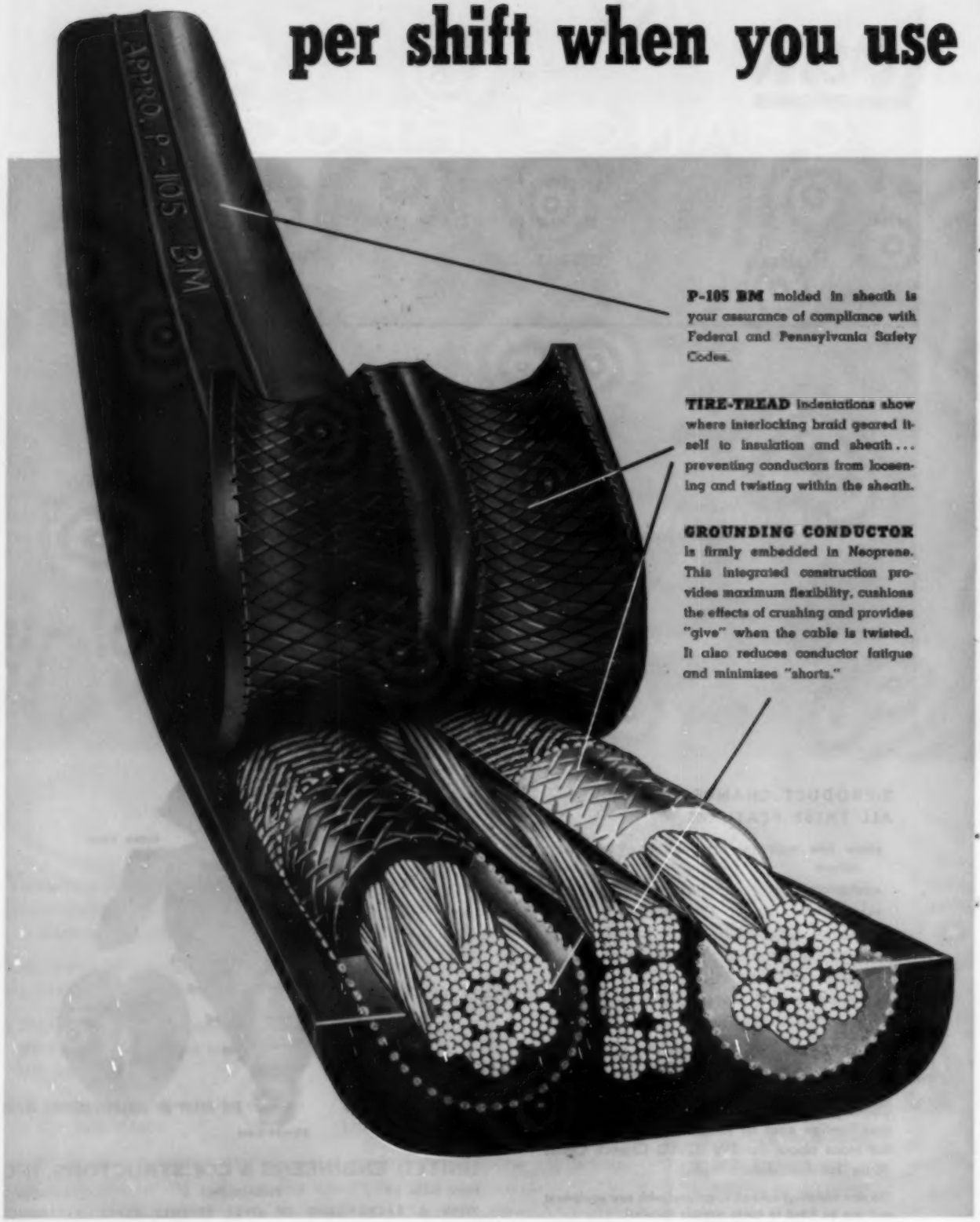
THE HEART OF THE PREPARATION PLANT

UNITED ENGINEERS & CONSTRUCTORS, INC

NEW YORK 17 PHILADELPHIA 5 CHICAGO 2

WITH A BACKGROUND OF OVER SEVENTY YEARS' EXPERIENCE

Why you get more tonnage per shift when you use


APPRO. P-105 BM
P-105 BM molded in sheath is your assurance of compliance with Federal and Pennsylvania Safety Codes.
TIRE-TREAD indentations show where interlocking braid geared itself to insulation and sheath . . . preventing conductors from loosening and twisting within the sheath.
GROUNDING CONDUCTOR is firmly embedded in Neoprene. This integrated construction provides maximum flexibility, cushions the effects of crushing and provides "give" when the cable is twisted. It also reduces conductor fatigue and minimizes "shorts."

Rome 60 Mining Cables

Firm interlocking braid prevents conductors from twisting or tearing away from tire-tough RoPrene sheath—minimizes cable failure.

If you want positive proof, do what we've done on the opposite page.

Peel back the tire-tough RoPrene (Neoprene) sheath from a Rome 60 flat twin (parallel duplex) Type G shuttle car cable. Note the indentations on the inside of the sheath and on the insulation of the conductors. Those were made by the sturdy interlocking braid as it geared itself to the insulation and sheath.

This braid prevents conductors from twisting or tearing away from the sheath even though subject to long-time twisting and bending under extreme tension.

Now, note the interlocking braid itself. See how it firmly embeds itself in the insulation of the conductors and in the sheath.

Note also that the grounding conductor is firmly embedded in a webbing of RoPrene (Neoprene). This gives maximum flexibility, cushions the effects of crushing and provides "give" when the cable is twisted.

It also reduces conductor fatigue and minimizes "shorts."

The heat-resistant rubber insulation offers exceptional overload protection, permits operation at 75°C.

Finally, the RoPrene (Neoprene) sheath itself is molded in lead to a tire-like toughness. It resists moisture, acids, oils, abrasion and flame. It is manufactured for heavy duty service.

You can minimize time-consuming splicing and down time, and increase tonnage per shift by standardizing on Rome 60 mining cables for all your mechanical equipment.

For general mine and coal preparation plant power distribution and lighting, specify RoMarine-RoPrene® power cables.

Here is the ideal all-round cable for mine power distribution. Its tough RoPrene (Neoprene) sheath resists moisture, acids, oils, abrasions and flame. RoMarine is a specially compounded heat and moisture resistant insulation, suitable for operation up to 75°C.

Rome 60 line includes:

Type SO Portable Cords • Single Conductor Locomotive Cables • Concentric Mining Machine Cables • Twin (Parallel Duplex) Mining Machine Cables Types W and G • Multiple Conductor Portable Power Cables Types W and G • Multiple Conductor Combination Power and Control Portable Cables for specific applications • Mine Power Distribution Cables • Shovel and Dredge Cables.

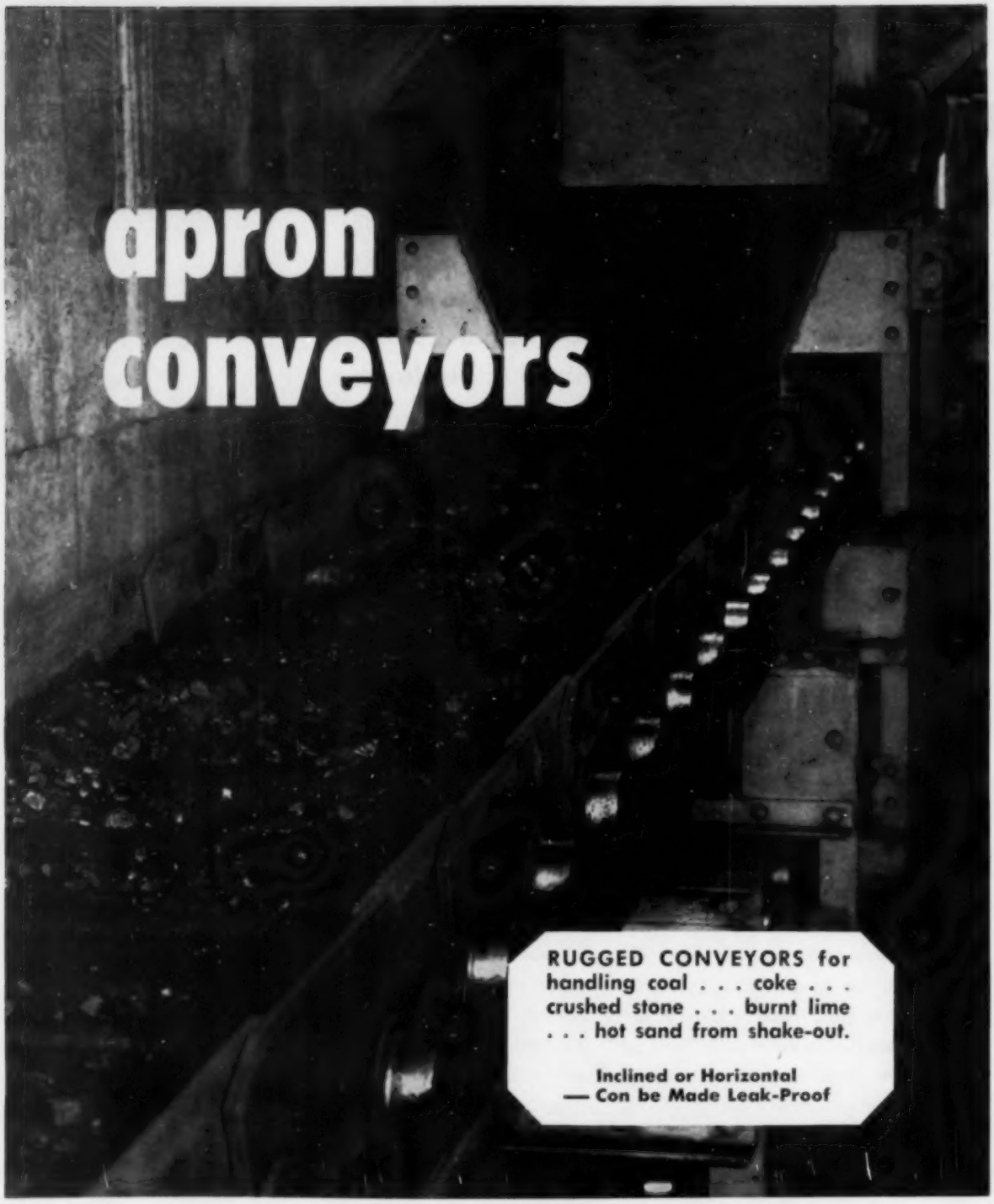
It Costs Less to Buy the Best!

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

ROME CABLE CORP., Dept. C-5, Rome, N. Y.
Please send me the Mining Cable Folder.

Name .....
Company .....
Address .....
City ..... State .....


apron
conveyors
RUGGED CONVEYORS for handling coal . . . coke . . . crushed stone . . . burnt lime . . . hot sand from shake-out.
Inclined or Horizontal — Con be Made Leak-Proof

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . . IT'S A JOB FOR JEFFREY!

ROCK RATED

to better your best production!

Pit a P&H 1055 against any comparable 3½ yd. machine and see how P&H takes over the production lead. And it *maintains* the pace day after day, under the toughest digging and loading conditions!

P&H years-ahead design and construction make the big difference. You get the extra strength of high-tensile alloy steels to withstand the pounding of repeated shock loads . . . the solid stability that lets you exert more power at tooth point. And only P&H has *Magnetorque* to swing you through five loads to the other man's four. It's the most dependable swing ever built — lasts the life of the machine!

Want the same outstanding features in a 2½ yd. machine? Ask us about the companion Model 955A.

with P&H *MAGNETORQUE** ELECTRIC SWING

- **15-25%** *faster* . . . . . .
- **100%** *free of friction and wear!*

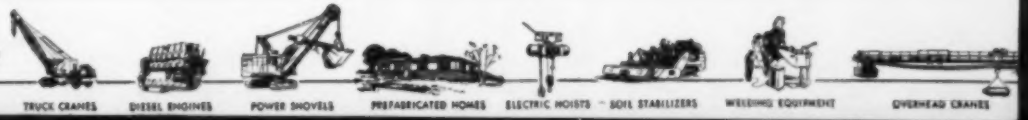
**T.M. of Harnischfeger Corporation for electro-magnetic type coupling.*

P&H LARGE EXCAVATOR DIVISION

HARNISCHFEGER CORPORATION

MILWAUKEE 46, WISCONSIN

the P&H *Line*



IH ... sure sign of lower hauling costs

A good many things indicate when a mine is well and efficiently run. One is the name INTERNATIONAL and the familiar IH on the trucks.

Both these emblems mean that no money is wasted in hauling coal. For INTERNATIONALS have a record of low-cost performance proved by 22 straight years of heavy-duty leadership.

INTERNATIONAL Trucks are "Tough-Job" engineered to provide extra margins of stamina and long life. They are all-truck engineered to provide utmost operating economy—with engines, axles, transmissions and other components exactly matched to the job.

Let your INTERNATIONAL Dealer or Branch show you how trucks with the IH emblem will lower your coal hauling costs. Time payments arranged.

INTERNATIONAL RF-190 6-Wheel Series with new INTERNATIONAL bogie, most modern and advanced bogie in the industry. GVW ratings, 30,000 to 38,000 lbs. Wheelbases, 145, 157, 175, 193, and 211-inches.

AMERICA'S MOST COMPLETE TRUCK LINE

172 basic models from ½-ton pickups to 90,000 lbs. GVW off-highway models . . . including six-wheel, four-wheel drive, cab-forward, and multi-stop delivery types . . . 30 engines from 104 to 356 hp., with widest choice of gasoline, LPG, or diesel power . . . wheelbases, transmissions, and axle ratios for any need . . . thousands of variations for exact job specialization.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

International Harvester Builds **McCORMICK**® Farm Equipment and **FARMALL**® Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL® TRUCKS

"Standard of the Highway"

the bits of The Bowdil Company are sold and known in the trade by the following registered trademarks

BOWDIL

TRADEMARK REGISTERED
U. S. PATENT OFFICE

THE FLAT SIDE BANDS ON OPPOSITE SIDES OF THE BIT IS THE REGISTERED TRADEMARK OF THE BOWDIL COMPANY . . .

. . . AND BITS MADE BY THE BOWDIL COMPANY ARE IDENTIFIED BY THIS TRADEMARK.

The BOWDIL COMPANY

Designers, Manufacturers and Distributors of Cutter Bars, Chains and Bits • Rope Sockets • Coal Drills • Miners' Picks and Spike Pullers • Bronze Bushings • Sales Agents for Cincinnati Electric Drills

BOYLAN AVENUE S. E. • CANTON 7, OHIO

G-E 20-TON LOCOMOTIVE HAULS 24 TEN-TON CARS FROM PHILLIPSON LEVEL MINE AT CLIMAX MOLYBDENUM CO.

Climax Molybdenum hauls 20% more load with faster, more powerful G-E locomotives

When Climax Molybdenum Company decided to replace some high-maintenance haulage locomotives at its mine in Climax, Colorado, it purchased two 20-ton four-axle, swivel-truck G-E locomotives. The company based its choice on the outstanding performance of the smaller G-E locomotives already in use at the mine.

Placed in service in January, 1953, the two new G-E locomotives have enabled Climax to increase efficiency. Each locomotive can haul four more cars per trip—a twenty percent increase in load. Also, higher speeds possible with these G-E locomotives mean more round trips per day. The result is higher production at the mill.

FINE PERFORMANCE IN EXTREME CLIMATE

The center cab design of the new locomotives increases operator safety. G-E heaters keep operators comfortable—even when winter temperatures drop to a wind-swept 30 below in the thin air at 11,500 feet.

Maintenance costs on these haulage locomotives have been low, despite the bitter climate in which they work and the heavy loads imposed on them. The fine performance of the new locomotives played an important part in Climax's decision to order an additional five similar units, which have recently been delivered.

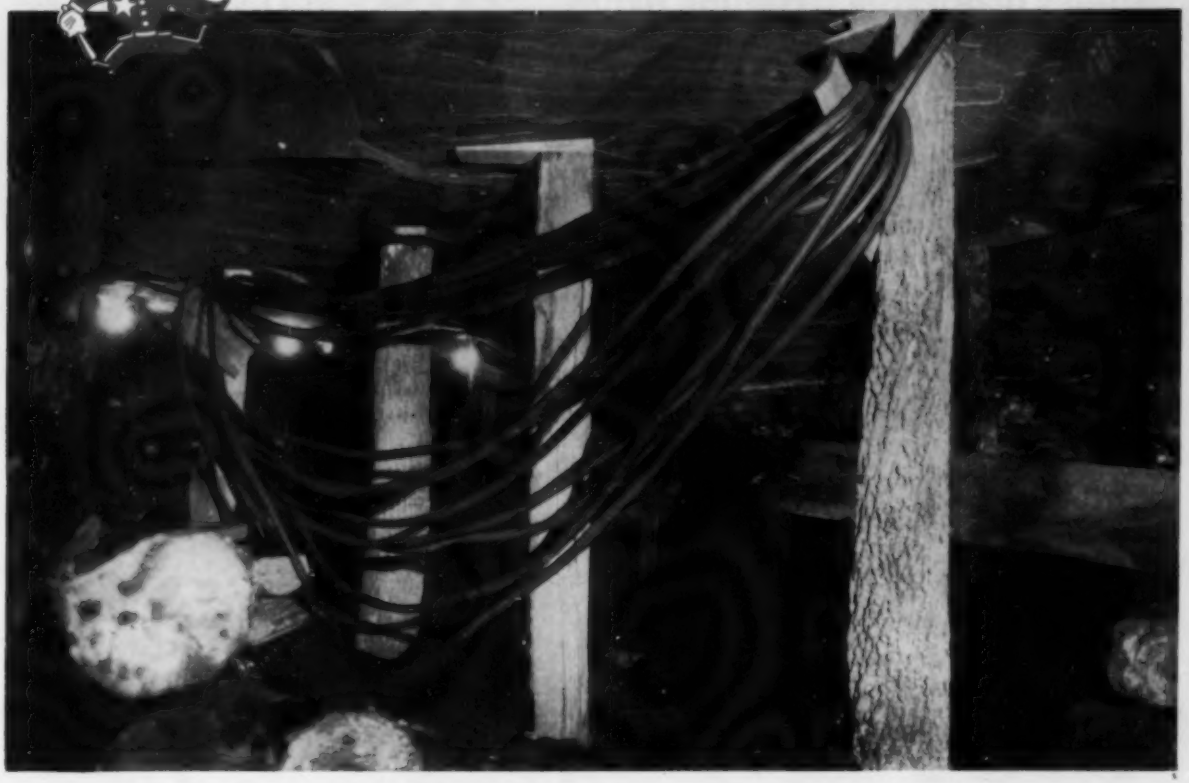
One of the several types of mine locomotives G.E. manufactures is probably right for your haulage requirements. You can get more information through your nearest G-E Apparatus Sales Office. Or, write to: *General Electric Co., Section 120-68, Schenectady 5, N. Y.*

OPERATORS LIKE THE SAFER, HEATED CENTER CAB

You can put your confidence in—

GENERAL ELECTRIC

Banish Idle Cable from Your Mine



This is one way many mines keep power cable for cutting, drilling, and loading machines out of harm's way. As the working area is extended, more cable is pulled off the posts. This method is expensive in cable, labor, and power costs.

If you use power centers and Simplex-TIREX PG and PCG Cables, you can avoid scenes like this and save money. As the working face advances, you couple together additional lengths of TIREX. You use only as much cable as you need.

Simplex-TIREX PG and PCG Cables provide you with all of the famous TIREX features — the cured-in-lead jacket, the Selenium Neoprene Armor, the flexible stranding, and "P-101-BM" markings. Service-tested TIREX is the best quality mining cable money can buy.

To permit rapid moving and reduced electrical hazards, install power centers. To get economical, dependable, long-lived PG and PCG Cables, specify TIREX. To find out more about TIREX, write to the address below for Catalog 1011.

Simplex

TIREX CORDS AND CABLES *are made only by the*

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

New use of modern equipment doubles profitable stripping depth — improves grade of coal

BACK in 1940, the Avon Coal Company found it was not profitable to strip more than 25 feet of overburden to reach a seam of coal. For this reason, shaft mining was used exclusively in their Minto, New Brunswick coal field.

But, today, with the help of a fleet of modern Allis-Chalmers tractors, the company now can strip up to 60 feet of overburden and then mine a 20-inch seam of coal at a profit. What's more, this new method and postwar equipment has resulted in the production of a far better grade of coal . . . has opened many new markets for Minto coal.

Ask your Allis-Chalmers dealer how modern earth-moving equipment can increase the efficiency of your program.

Much of the excavating is done by the giant HD-20G Tractor Shovel owned by Crawford Contractor's Ltd. This powerful hydraulic torque-converter driven unit combines crawler-tractor flexibility with the capacity of a four-yard shovel . . . is equally useful in stripping, loading and stockpiling.

Three Allis-Chalmers HD-5G Tractor Shovels offer the responsive bucket control necessary to skim off the narrow coal seam cleanly. The high-grade coal resulting from this precision work has won many new customers for the Avon Company.

A second HD-20 with bulldozer handles large-scale stripping and stockpiles coal. It took powerful postwar equipment like this to make strip mining practical in the Minto Coal Field.

Keeping haul roads smooth is only a part-time job for the Allis-Chalmers Model D Motor Grader. Equipped with "midship" scarifier and hydraulic rear-end loader, the D has become a most versatile handy man around the mine.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Republic Steel Corp.
Sayre Mine
Birmingham, Alabama

Old Ben Coal Corp.
Franklin County, Ill.

Seminole Coal Corp.
Lenzburg, Ill.

Sunnyside Coal Corp.
Stone, Ky.

Blue Diamond Coal Co.
Tilford, Ky.
Nearing completion to process 14" x 0 coal.

Ethel Chilton Mines, Inc.
Ethel, W. Va.
Starting construction of 100 TPH washer addition processing 12" x 0 coal.

The McNally Tromp Heavy Media Washer *is on the March!*

Coal operators today are faced with two vital production problems. 1) The increased necessity to produce premium coals from raw coals of inferior quality. 2) Increasingly stringent market standards in the production industries resulting in more rigid limits within the specifications.

The McNally Tromp Heavy Media Washer is designed to meet today's needs for positive separation of non-combustible materials, and accomplish that result on a highly efficient, low-operating-cost basis.

For coal operators the McNally Tromp is the answer in many cases. Among coal users the coals processed in the McNally Tromp are meeting with the utmost satisfaction.

The following epitomize both coal operator and coal user reaction:

COAL OPERATORS SAY:

"The results are amazing and defy comparison."

COAL USERS SAY:

"I never had such uniformity of product carload after carload."

The "man with the hydrometer" is OUT

100 Per Cent Automatic Control

Just as the McNally Norton Washer eliminated "the man with the stick" the McNally Tromp automatic density regulator removes *"The man with the hydrometer"* with all of his human uncertainty. The automatic density regulator incorporates a built-in hydrometer to do the testing mechanically, automatically, continuously, and scientifically.

GET ALL THE FACTS ABOUT THE McNALLY TROMP

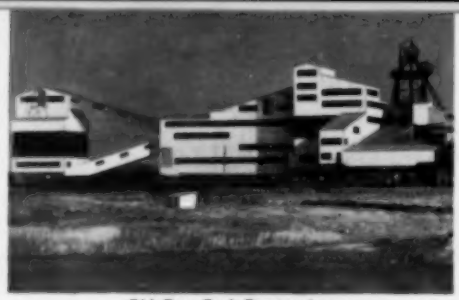
MAIL THIS CARD

FIRST CLASS
PERMIT No. 93
(Sec. 34.9, P. L. & R.)
PITTSBURG, KANSAS

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

4c-POSTAGE WILL BE PAID BY—
McNally Pittsburg Mfg. Corp.
PITTSBURG, KANSAS

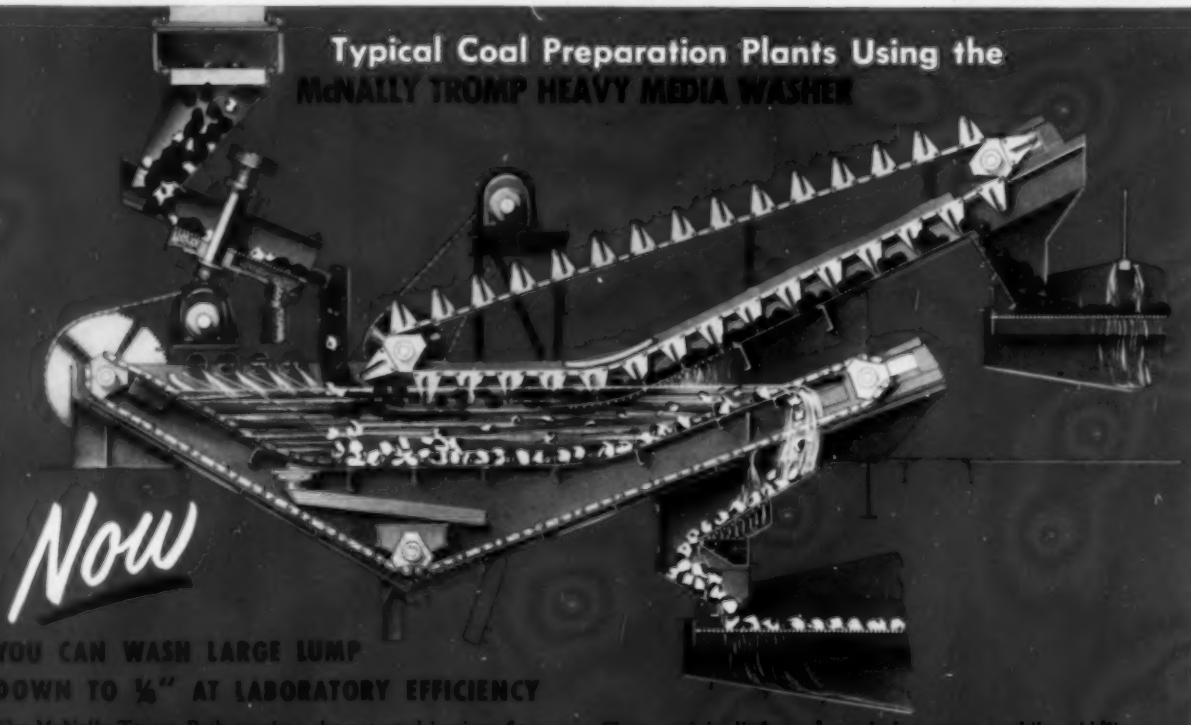
Seminole Coal Corporation
Lenzberg, Ill.



Old Ben Coal Corporation
Franklin County, Ill.

Republic Steel Corporation
Sayre Mine, Birmingham, Ala.

Typical Coal Preparation Plants Using the McNALLY TROMP HEAVY MEDIA WASHER



Now

YOU CAN WASH LARGE LUMP DOWN TO ⅛" AT LABORATORY EFFICIENCY

The McNally Tromp Bath employs the patented laminar flow principle. Coal enters the bath at a controlled rate of discharge from the raw coal conveyor. It moves continuously and slowly through the bath and by flotation the coal rises. Coal, clean coal conveyor, middle gravity particles, dense media solution, and sink conveyor move at the same speed through the bath from raw coal inlet towards the discharge end with no turbulent or disturbing upward currents.

Clean coal is discharged to rinsing screens while middlings, transported by laminar flow solution, are intercepted by refuse conveyor near refuse discharge point. They are then discharged, along with refuse, to the refuse rinsing screens.

The McNally Tromp Bath utilizes coarse ground magnetite, mill scale, limestone, or other heavy media specific gravity particles which may or may not be recovered by magnetic principle.

IT COSTS LESS TO BUY THE BEST . . . DESIGNED AND BUILT BY *"The Men Who Know Coal From The Ground Up"*

STATE YOUR PROBLEM HERE OR ON YOUR LETTERHEAD

Send us your recommendations on how we may use the McNally Tromp Dense Media Cleaning System.

We are operating on_____seam.

We would like to wash_____x_____coal at_____tons per hour,

at our_____mine, located at_____

Name_____Title_____

Company_____

City and State_____

( ) Have Sales Engineer call for further consultation.

( ) Mail your Bulletin No. 451.

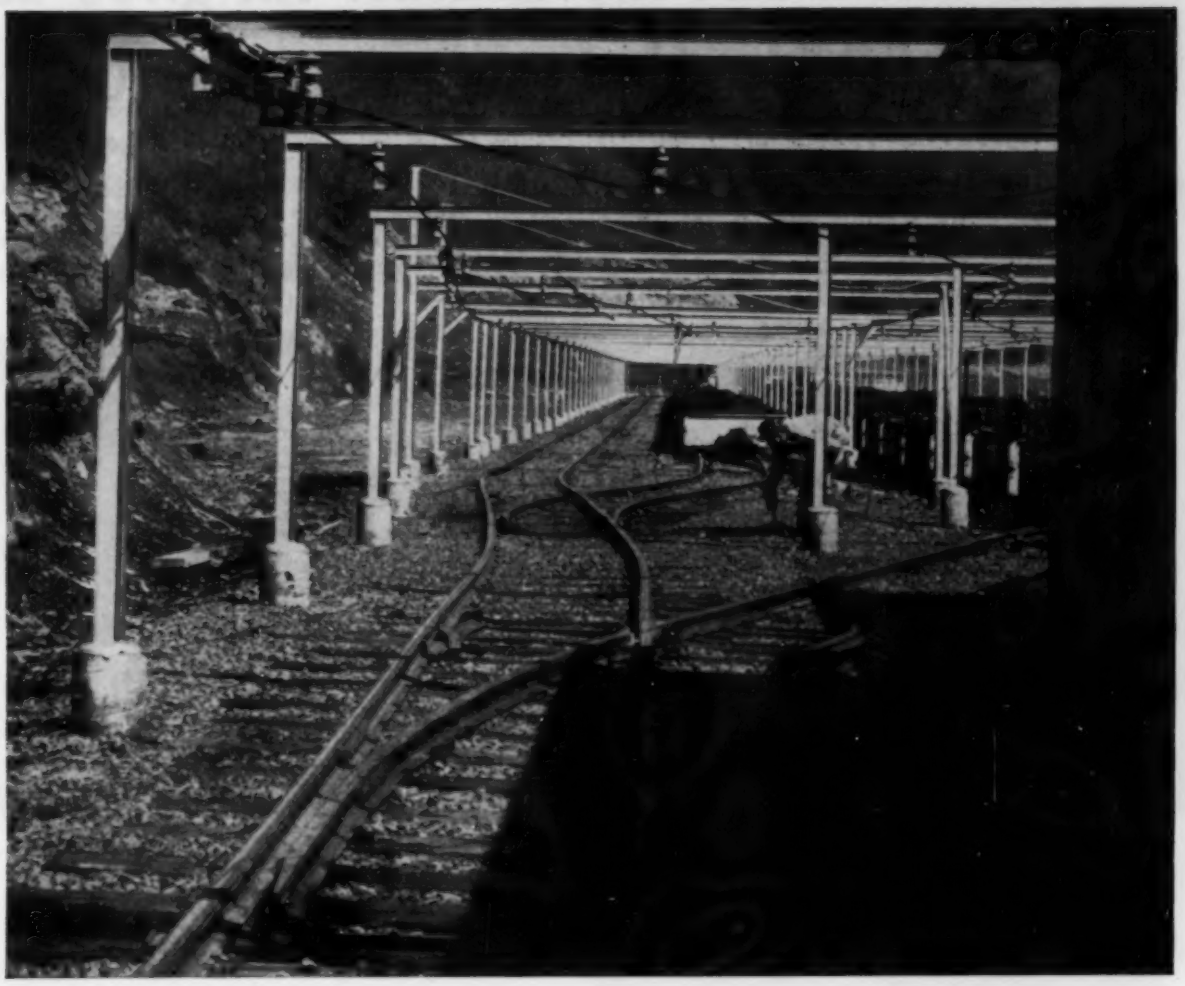
Coal operators who look . . . INVESTIGATE . . . and install a McNally Tromp can get in the toughest markets, and stay there.

TAKE THE FIRST STEP . . . MAIL THE CARD

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio • Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio



Here the Traffic Really Rolls

This is the kind of track that gives a mine official no worries at all. It is well planned, well made, well laid out. The part you see here—neat, trim, and compact—is typical of the whole system.

It's a Bethlehem prefabricated job, designed not only for present needs but those of the future. Working in close co-operation with the mine owners, Bethlehem studied every detail of the haulage problem; then designed the trackage and made the components. Rails were precut and precurved, with lengths and radii calculated exactly. Every element, down to the last bolt and nut, was selected to fill a particular need.

The system shows an advanced degree of planning and the highest level of workmanship. It can handle a large volume of high-speed traffic, with consistently low upkeep expense. It is a system free of the haulage snarls that are often so costly in man-hours and money.

Track like this pays off in a very short time. Why not ask us for full details? We can design and furnish you the whole layout, complete with rails, switches, switch stands, frogs, guard rails, braces, joint bars, and even the fastenings. Call for a Bethlehem engineer; he'll gladly come to your office and tell you how we work.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM PREFABRICATED TRACK

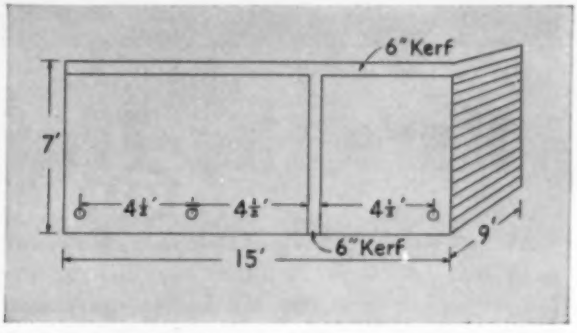
"We've found Du Pont 'Monobel' AA gives us better loadability and maximum coarse coal"

Says Mr. G. W. McCaa, General Manager, Jamison Coal and Coke Company, Farmington, W. Va.

"It's proved itself in both top and bottom shooting—even in wet mines. On job after job, we load out the maximum percentage of firm, coarse coal. Having used 'Monobel' AA since it was first introduced into the northern West Virginia coal field," continued Mr. McCaa, "we've had plenty of opportunity to test and evaluate it. In my opinion, it's the most uniform permissible yet produced. Our No. 9 Mine, located in Farmington, points up one of our typical applications of 'Monobel' AA."

1. Fall of lump coal made with Du Pont "Monobel" AA. After sounding the roof, Superintendent George Cain commented: "'Monobel' AA makes our work easier. Because of its density, this permissible loads to the back of the hole and when detonated, throws the coal out—where loading machines can work on it. Speeds the job, while giving top-grade coal."

2. Clean-up operations, as Superintendent Cain checks location and Section Foreman George Alberts marks up the place. This unretouched photograph shows how cleanly the heaving action of Du Pont "Monobel" AA has sheared the back and ribs. Small percentage of fines obtained minimizes work at cleaning plant.



3. Shooting pattern for No. 9 Mine. The Jamison Co. called in Du Pont technical service men to assist in developing it. Rooms are top cut and sheared. Result is an efficient operation which pays off in better coal production. And even greater economy has been introduced through the use of Du Pont Iron Wire Electric Blasting Caps.

Prominent mine owners and operators everywhere are getting better loadability and maximum coarse coal with Du Pont "Monobel" AA. Its high bulk strength . . . low velocity . . . excellent fumes . . . and good water resistance have made it the world's largest-selling permissible. If you're not already using "Monobel" AA, try it soon. For full details, contact the Du Pont Explosives Representative in your area. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

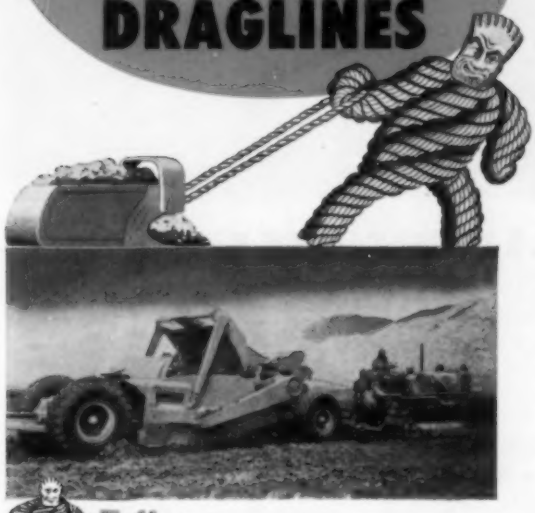
DU PONT
PERMISSIBLES
Blasting Supplies and Accessories

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Strip Dragline Replacement Costs with

Tuffy® DRAGLINES



Tuffy Dragline is a wire rope designed to run longer. In some cases it has gone twice as long. This cuts down on the frequency you are out-of-pocket for a new dragline and for machine and manpower down-time.

On the kind of investment involved in a big walking drag, savings like this can help materially in preventing a squeeze on profits that hurts.

Here's why Tuffy Draglines are capable of longer runs. The steel is harder and tougher with larger surface wires to give greater area to resist abrasion longer. The inner construction is of wires sized and layed to team up with the larger surface wires to give greater strength to withstand the pull and shock stresses imposed everytime the bucket is loaded. All this is accomplished in Tuffy Dragline construction without sacrificing the flexibility needed when casting the bucket.

Try stripping with Tuffy Dragline. See for yourself how much Tuffy can strip down your dragline replacement costs. Just give your Union Wire Rope distributor the diameter and length of dragline needed for your next replacement. Tuffy Dragline is the only other specification necessary.

Tuffy
Scraper Rope
Flexible enough to withstand sharp bends . . . stiff enough to resist looping and kinking when slack . . . tough to stand off drum crushing longer.

Tuffy
Slings
9-part, machine braided wire fabric construction is extra flexible, extra strong and one which kinking and knotting does not damage materially.

Tuffy
Dozer Rope
Designed to take the punishment of small winch drums and small sheaves . . . the shock of blade manipulation under toughest going!

Tuffy
Slusher Rope
Rigid, non-collapsing to eliminate drum crushing, to resist abrasion and the impact of shock loads.

union Wire Rope **corporation**

2130 Manchester Avenue Kansas City 26, Mo.

Specialists In High Carbon Wire, Wire Rope and Braided Wire Fabric

FOR THAT EXTRA MARGIN IN SHOVEL PERFORMANCE...

WARD LEONARD ELECTRIC EXCAVATORS

MORE OUTPUT even under the toughest conditions . . . more loads per shift in any quarry or mine . . . extra loads for that EXTRA MARGIN in performance . . . that's what you get from this exclusive combination of shovel front-end features:

1. **TWO-SECTION BOOM** provides maximum strength with minimum weight. The lower section is rigidly connected to the A-frame . . . takes the heavy stresses of the digging cycle in stride because it is part of the main machine.

2. **TUBULAR DIPPER HANDLE** is much lighter than equivalent two-member handle, yet equally strong. Its ability to rotate in the rubber-cushioned saddle block eliminates torsion during the digging stroke, minimizes shock loads.

3. **TWIN DUAL HOIST ROPES** assure a steady, positive digging action with automatic shift of hoist power to that part of the dipper lip where it is needed.

4. **INDEPENDENT ROPE CROWD** is simple, positive and quiet. Shipper shaft pinions and handle racking are eliminated. Crowd machinery is located on main deck rather than on boom — swing inertia is reduced, the operating cycle speeded up.

5. **QUICK CONVERTIBILITY** to dragline of the independent motor type. Hoist and drag functions are powered by separate motors, eliminating operating clutches and brakes. 5154

These features — plus many more — make Bucyrus-Eries the finest heavy-duty excavators ever built: yard for yard, dollar for dollar, pound for pound. Write today for complete information on the 4½-yd. 110-B, the 6-yd. 150-B, or the 8-yd. 190-B.

Bucyrus-Erie Company

SOUTH MILWAUKEE
WISCONSIN

ANOTHER

FAIRMONT PREPARATION PLANT

Fairmont-built plant processing 210 TPH of 7" x ⅛" No. 4 Pocahontas coal for the Gulf Smokeless Coal Co. at Tams, W. Va.

Something Extra

...for tough cleaning jobs

Where a high reject rate and percentage of near gravity material presents a cleaning problem, the competitive market demands an efficient cleaning process.

Fairmont-built Preparation Plants meet those market demands through coordinated responsibility in design, engineering, fabrication and erection . . . coordinated responsibility which results in specifying the proper equipment to do the job and "something extra" toward greater operating economy and production efficiency.

When you have a cleaning problem, let Fairmont assume the full responsibility of providing or modernizing a plant that guarantees product uniformity and over 99% separating efficiency through a wide size range in any tonnage capacity. Call a Fairmont Engineer.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

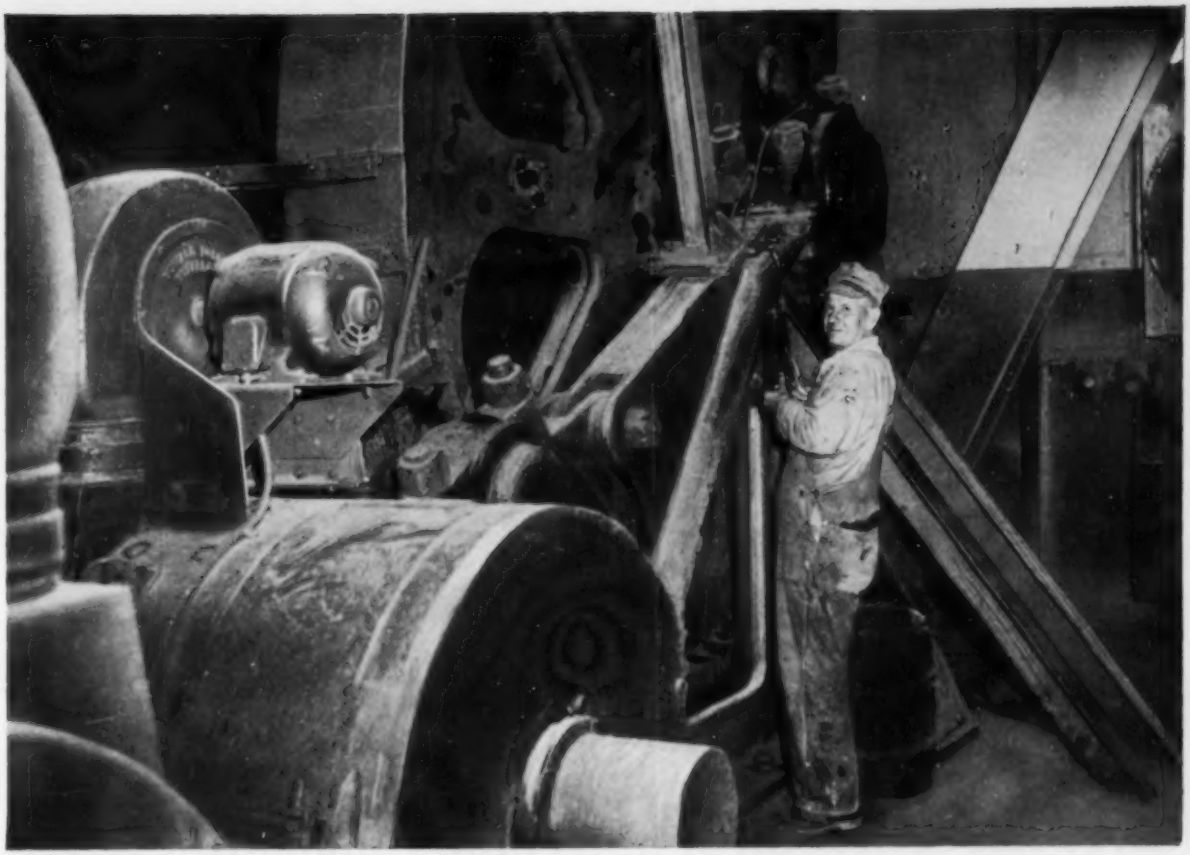
Wire Rope at Work—This is part of the surface installation at The New Jersey Zinc Co.'s mine at Friedensville, Pa. From the hoist house (one of the most modern in the country) wire ropes for the materials hoist and counterweight are run to giant bicycle sheaves, from which they rise to the headframe. There they begin their vertical descent to the shaft, which is approximately 1250 ft in depth.

Rock and earth from the underground drifts are brought to the surface in the hoist, so the loads are very heavy. To provide a hoisting rope that would combine great strength with high flexibility, the management selected 1975 ft of 1⅜-in. Bethlehem Purple Strand with the Form-Set (preformed) construction. The counterweight rope, also Purple Strand, is a 1⅜-in. 18 x 7 nonrotating line. These two heavy-duty ropes have more than earned their keep in the gruelling day-in, day-out service for which they were installed.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:
MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING

BETHLEHEM STEEL
BETHLEHEM WIRE ROPE



"This Grease Stopped Overheating of Bearings!"

says Mr. Beeler, Sunlight Coal Company, Boonville, Ind.

When you've got a lot of money tied up in a piece of equipment – as does the Sunlight Coal Company, you can't afford idle time caused by burned out bearings.

Mr. Beeler writes, "Our Marion Dragline #7800 is protected by Sinclair Lubricants... from dolly rollers to hoist cables. Experience has proved to us that Sinclair HEAVY DUTY BEARING GREASES put an end to overheated bearings. Sinclair GEAR PROTECTIVE COMPOUND gives us all-weather performance – and Sinclair JET LUBE #20 maintains a better film on dolly rollers and track."

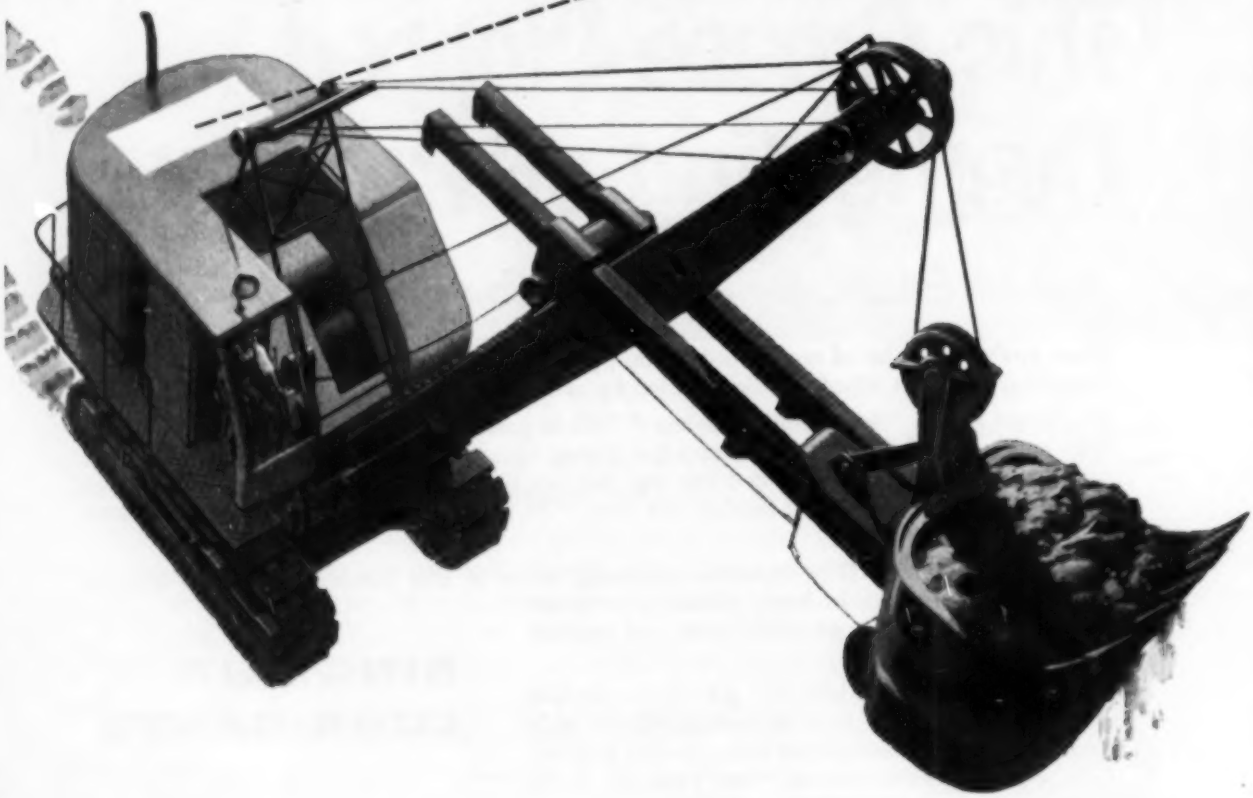
Mr. Beeler continues, "The important advantage to us is that Sinclair Lubricants provide optimum performance in heavy mining operations over the broadest range of temperature and weather conditions."

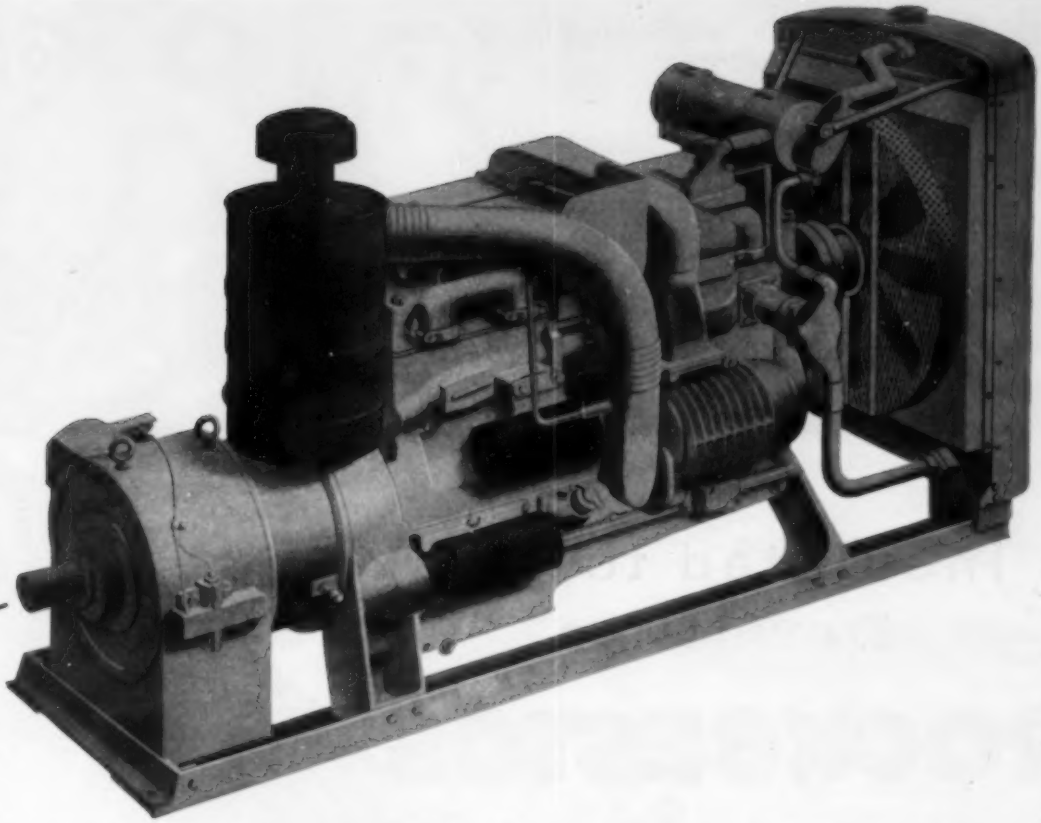
Let Sinclair Lubricants help you get all the life and *working hours* out of *your* equipment. Phone your local Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

Cummins Diesel - torque converter package speeds work cycle as much as 30%

Gives full utilization of horsepower, minimizes shock





loads, adds to life of shovels, cranes, and draglines

Cummins Torque Converter Packages give smooth steady power over the entire digging or working cycle. Even where digging is the toughest and power requirements fluctuate widely, the Cummins Torque Converter maintains power without lugging, stalling or overspeeding. Crane work, too, can be speeded because loads can be handled more smoothly and accurately.

The output of the Cummins Torque Converter Package is measured by an output shaft governor which determines the exact amount of power required each instant and automatically matches engine speed to load requirements. This increases work capacity, adds to equipment life, saves fuel and engine wear.

Cummins Diesels, ranging from 60 to 600 h.p., equipped with one of many types of torque converters, can match any job you have. Available as replacement units or in many makes of new equipment.

CUMMINS **Cummins** Engine Company, Inc.
Columbus, Indiana

Rugged diesel power (60-600 h.p.)

Insulated to Cut Your Downtime

ROCKBESTOS AVC®

MOTOR LEAD CABLE

Rockbestos AVC is built to eliminate internal wiring failures on locomotives, loaders, cutters and shuttle cars. Keeps them going longer . . . helps increase your tonnage. That's why leading equipment manufacturers specify and buy it.

Constructed of non-burning asbestos, impregnated with heat and moisture resistant compounds, wrapped with dielectrically strong varnished cambric, it's practically indestructible. Takes heat up to 230°F without cracking or drying out. Resists acids, oils, alkalies and minerals.

Sized to fit bushings properly, it withstands the roughest vibration and shock common to mine service.

You'll find it pays to follow the leaders . . . and insist on Rockbestos AVC for all your new and old machines.

ORDER FROM THESE JOBBERS — SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.
National Mine Service Co.
BIRMINGHAM, ALA.
Moore-Handley Hardware Co.
BLUEFIELD, W. VA.
Superior-Sterling Co.
CHARLESTON, W. VA.
Charleston Electric Supply Co.
CLARKSBURG, W. VA.
Westinghouse Electric Supply Co.
COWEN, W. VA.
Pennsylvania & W. Virginia Supply Corp.
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Pennsylvania & W. Virginia Supply Corp.
EVANSVILLE, IND.
Evansville Electric & Manufacturing Co.
FAIRMONT, W. VA.
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GREENSBURG, PA.
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Westinghouse Electric Supply Co.
SCRANTON, PA.
Pennsylvania Electric Engineering Co.
WHEELING, W. VA.
Westinghouse Electric Supply Co.
WASHINGTON, PA.
Fairmont Supply Co.
WILLIAMSON, W. VA.
Williamson Supply Co.

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO
PITTSBURGH • ST. LOUIS • LOS ANGELES
OAKLAND, CALIFORNIA • NEW ORLEANS • SEATTLE

Joy conveyor belt on TIMKEN® bearings exceeds rated capacity by 1000 tons per hour!

ALTHOUGH the 48-inch Joy conveyor belt at the Peabody No. 10 mine at Pawnee, Illinois, has a rated capacity of 1000 tons an hour, peak tonnages have hit over 2000 tons per hour! This belt is part of an all-conveyor-belt system with a total length of 1729 feet. Throughout this entire system Timken® tapered roller bearings are used on the troughing and return idlers!

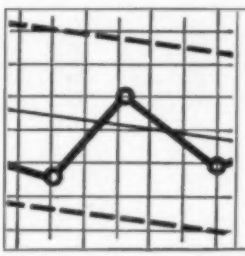
Timken bearings are the only tapered roller bearings proved by 15 years or more of service in heavy-duty conveyor installations using the popular dead shaft construction. Due to line contact between roller and races, they have high load capacity. And by using Timken bearing sizes that are mass produced for the automotive industry, you get extra capacity bearings that actually cost you *less* than the smaller sizes you'd normally use.

You get longer roller and belt life with Timken bearings. Their true rolling motion and extremely smooth surface finish mean less friction—less sliding and scuffing between idlers and belt.

With Timken bearings, you get longer life, minimum maintenance. Remember "Timken" is not a bearing type. It is a trade-mark applying to bearings made by The Timken Roller Bearing Company. Insist on Timken bearings in the conveyors you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

JOY MANUFACTURING COMPANY'S heavy-duty conveyor belt at Peabody No. 10 mine uses Timken tapered roller bearings on the troughing and return idlers.



STATISTICAL QUALITY CONTROL

To insure uniform high quality and closer tolerances, the Timken Company uses statistical quality control. With it, tolerance deviations are plotted graphically. It's one of industry's newest, most scientific methods of improving product uniformity.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST ↔ LOADS OR ANY COMBINATION ✳

if you want lower V-Belt costs—

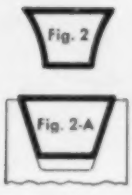
When a V-Belt bends, you can feel its sides change shape.

just make this simple test

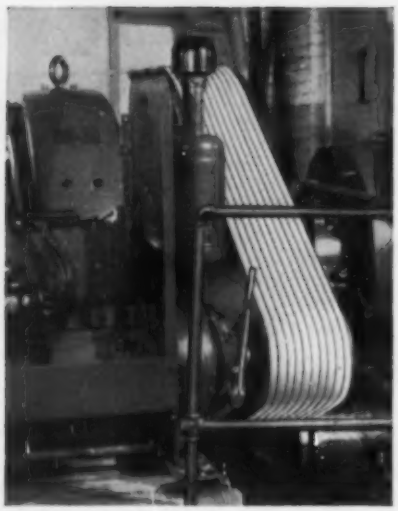
Take *any* V-belt that has *straight* sides (Fig. 1). Bend that V-belt while you grip its sides with your fingers. You will *feel* the sides *bulge out* (Fig. 1-A). Clearly, that out-bulge forces the belt to press *unevenly* against the V-pulley—and this *concentrates* wear at the points shown by arrows (Fig. 1-A).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U.S. PAT. NO. 1813698)



Instead of *bulging*, the precisely engineered CONCAVE SIDES merely *fill out* and become perfectly straight. This belt, when bent, *precisely fits* its sheave groove (Fig. 2-A). The sides of the Gates Vulco Rope press *evenly* against the V-pulley. Therefore, wear is distributed *uniformly* across the *full face* of this belt —resulting in *longer* belt life and *lower* belt *costs* for you!



Typical Gates Vulco Rope Drive —the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-belts, be sure to get the V-belt with the Concave Sides—the Gates Vulco Rope!

Gates VULCO ROPE DRIVES

REG. U.S. PAT. OFF.

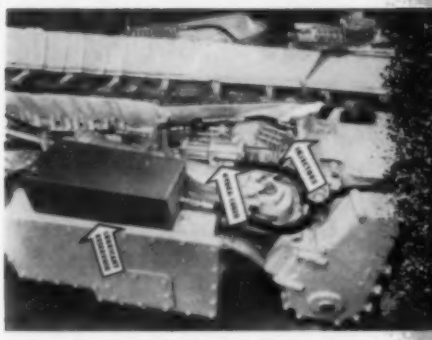
Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

THE GATES RUBBER COMPANY
DENVER, U.S.A.

CS-949

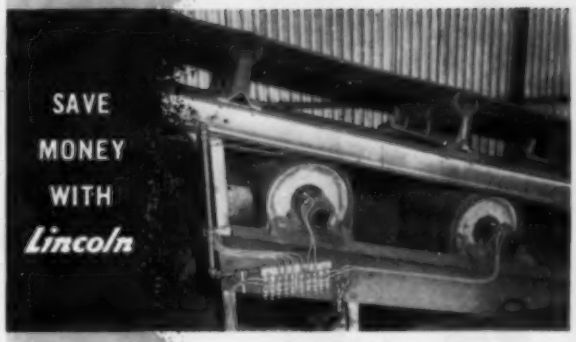
here's why **Lincoln** lubricating equipment

slashes operating costs IN MINES



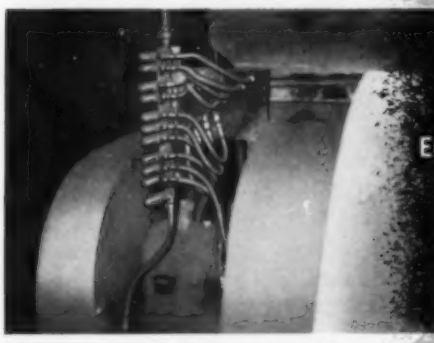
SAVE WORK WITH *Lincoln*

A Centralized Lubrication System frees manpower for other work . . . automatically lubricates 68 bearings simultaneously, on each loader, at Philip Sporn Mine.



SAVE MONEY WITH *Lincoln*

Centralized Lubrication Systems save Hanna Coal Company $32,240 a year in labor alone at their Georgetown preparation plant.



SAVE EQUIPMENT WITH *Lincoln*

A Lincoln Centralized Lubrication System automatically lubricates 500 bearings and increases the profitable working life of equipment at Wierton's Isabella Mine.

SAVE TIME WITH *Lincoln*

This unique Power Lubrication Unit is taken right to the job to speed up equipment maintenance at Perry Coal Company, O'Fallon, Illinois.

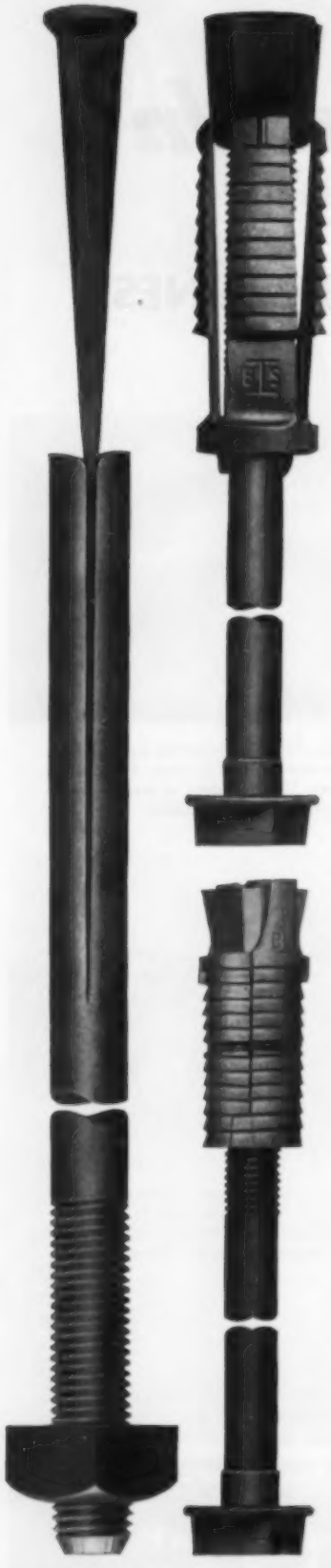
For more information about Lincoln Lubricating Equipment for the mining industries, write for Catalogs 64 and 80.

Lincoln

THE MOST TRUSTWORTHY NAME IN LUBRICATING EQUIPMENT

LINCOLN ENGINEERING COMPANY

5729 Natural Bridge Avenue, St. Louis 20, Missouri



Our accident rate is down, now that we're using roof bolts

"Since we replaced the old-style roof supports with steel roof bolts, the accident rate at this mine has dropped considerably. Not only that, working conditions are better, too."

Roof bolting reduces the possibility of mine accidents because the bolts act as "sky hooks." They consolidate several layers of strata into a thick beam, and hold them together as a single unit. In addition to affording greater protection to workers, roof bolting also makes possible wider clearances, increased room in which to operate mechanized equipment, and improved ventilation.

To enable operators to obtain these conditions, Bethlehem manufactures two types of roof bolts for use with expansion shells; also a slotted bolt for use with a steel wedge. All three types come in lengths of from 2 ft to 8 ft.

SQUARE HEAD BOLTS

⅝-in. Diameter. A square-head, high-strength bolt, having the same physical characteristics as the Bethlehem ¾-in. bolt. Designed for 1⅜-in. hole. Can also be used in 1-5/16 in. hole. Comes without ears, and is recommended for use with uniformly-expanding Type "F" shell. The shell, consisting of two pieces held in place by a wire spring, has maximum expansion of 1⅞ in.

¾-in. Diameter. This ¾-in. square-head bolt is for use in a 1⅜-in. hole. Has rolled threads and an unchamfered head. Used with Type "C" shell. Pressed ears on bolt shank support shell during anchoring. When bolt is tightened, the leaves of shell expand in the hole. Bolt is also suitable for Type "F" shell.

SLOTTED BOLT

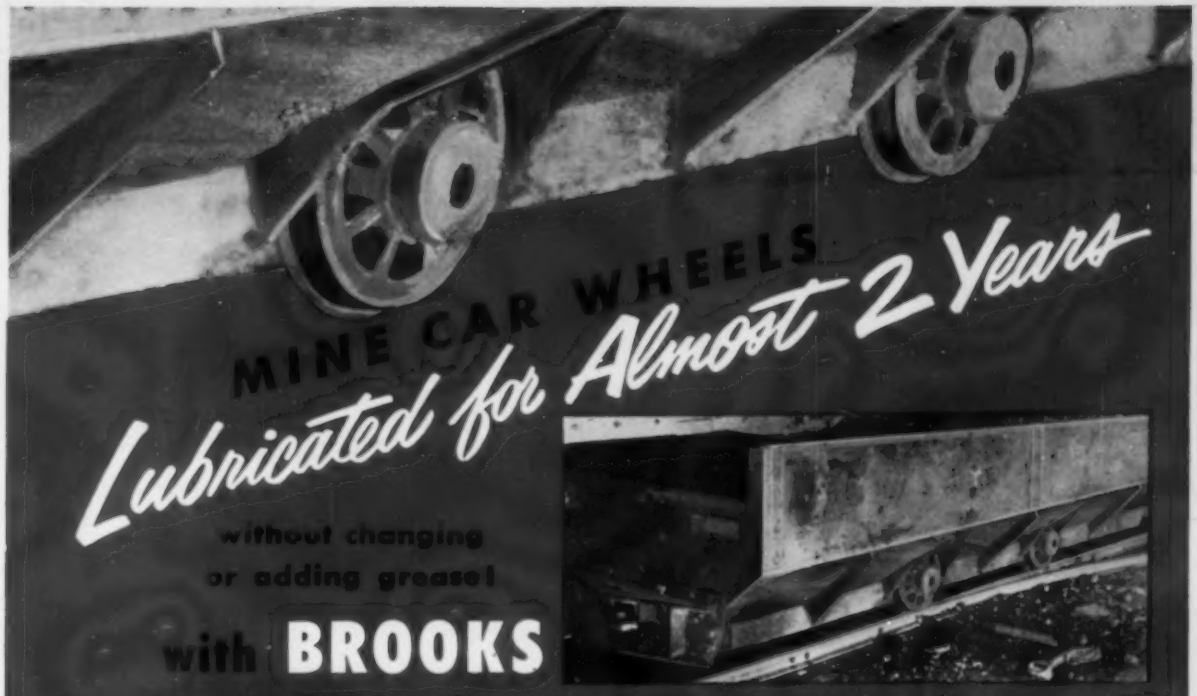
A 1-in. bolt with centered, forged slot. No metal removed during slotting. Other end of bolt has 5 in. of 1-in. rolled threads. When driven in 1¼-in. hole, wedge drives deep into slot when back of hole is reached, expanding end of bolt. Truncated-cone point prevents damage to threads. Fitted with American Standard Regular Square Nut.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM MINE ROOF BOLTS



MINE CAR WHEELS

Lubricated for Almost 2 Years

without changing
or adding grease!

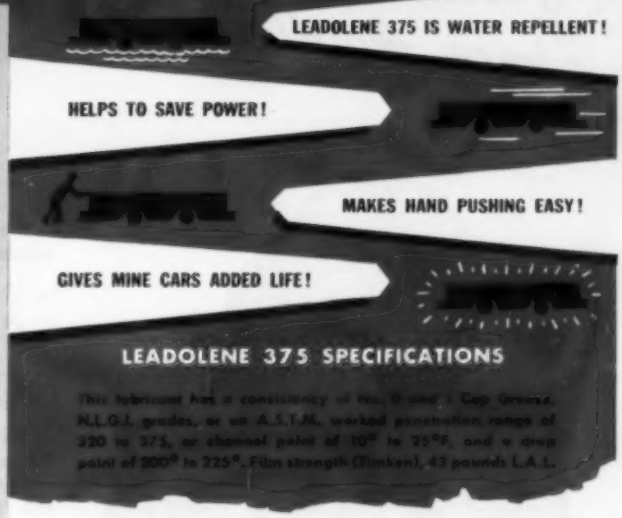
with **BROOKS**

LEADOLENE 375

A large mine in Western Pennsylvania tested *Leadolene 375* in the roller-bearing wheels of an 8 ton capacity steel mine car. At two month intervals, a wheel was removed and inspected. At the end of *22 months* a few ounces of the lubricant remained in the housing and the roller bearings were in perfect condition. No grease was added!

This test was made under actual mine operating conditions—with the car being subjected to regular coal mine loading and transportation practice. It is an outstanding achievement for Leadolene 375, since it has been customary to grease mine car wheels every six months, with other lubricants.

Investigate the savings made possible with Leadolene 375 in lubricating roller bearings in *your* mine car wheels. Write our nearest sales office today!



LEADOLENE 375 SPECIFICATIONS

This lubricant has a consistency of No. 0 and 1 Cup Grease, N.L.G.I. grades, or an A.S.T.M. worked penetration range of 320 to 375, or channel point of 10° to 25°F, and a drop point of 200° to 225°. Film strength (Timken), 42 pounds L.A.L.

The Brooks Oil Co.

Better Industrial Lubricants Through Constant Research

SINCE 1876

DISTRICT SALES OFFICES: CLEVELAND, OHIO
PITTSBURGH, PA. • GIRARD, OHIO • DETROIT, MICHIGAN
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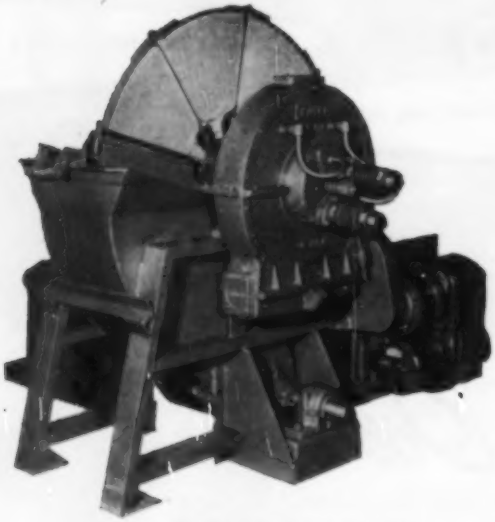
(MONTREAL DISTRICT) QUEBEC • SANTIAGO DE CUBA

Executive Offices and Plant.....CLEVELAND, OHIO
Executive Sales Offices.....PITTSBURGH, PA.
Canadian Offices and Plant.....HAMILTON, ONTARIO
Cuban Office.....SANTIAGO DE CUBA

Economical Coal Fines Recovery on Eimco Agidiscs



This 22 sq. ft. Agidisc filter unit available for pilot or test work in your own plant.

Eimco Agidisc filters will dewater more coal fines per square foot of filter area per hour because:

1. **The gentle agitation keeps the fast settling particles in suspension.**
2. **Even dispersion of particles over disc surface provides uniform drying of cake.**
3. **Even cake formation prevents vacuum leaks and provides better cake drying over entire surface.**

These features mean greater savings to every operator. Filtrate from the Eimco Agidisc varies in clarity with regard to plan, location and process, but in most cases the filtrate may be returned directly to the stream and is well within the requirements of existing anti-pollution laws.

Eimco Agidisc units provide the greatest percentage of economically retrievable coals for the smallest amount of capital investment.

Write for more complete information to The Eimco Corporation, Box 300, Salt Lake City 10, Utah.

THE EIMCO CORPORATION

Export Offices: Eimco Bldg., 52 South St., New York City • Salt Lake City, Utah—U.S.A.

You Can't Beat An Eimco

Wire rope?
What's that got to do with us?

A lot more than you might think, folks. Consider, for example, the heating in your home . . . the warmth that keeps *her* snug and comfortable through a wintry night. Whether you use coal, oil or gas—wire rope is an indispensable part of the equipment that probes the earth's depths to bring this comfort to you. Chances are, it may be Wickwire Rope. Because for over half a century Wickwire Rope has been an outstanding favorite with men in the mining and petroleum industries. Like users in numerous other lines of business, these men know that for unfailing performance, longer life and more economical service—there's nothing to match the quality and care that go into the making of WICKWIRE ROPE.

A YELLOW TRIANGLE ON THE REEL IDENTIFIES WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION—Abilene (Tex.) • Denver
Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION—Los Angeles • Oakland
Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga
Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia

1792

WICKWIRE ROPE
CF&I PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

"All day I watch the coal go by!"

"Train after train. Day and night. Year after year. You wonder where it all comes from and how long it can last."

• • • • • • • • •

You're right, Pop, it's a lot of coal – close to half a billion tons a year. Yet, in the more than a century this country has been mining coal, we have used up only a little over one percent of our known supply. 98.8% of the coal that nature put under our soil is still there for future generations.

That is something to think about when you are considering a new heating plant for home or industry. Other fuels will be getting scarce. Every year the wells go deeper. More and more of our fuel oil comes from foreign fields. Growing scarcity can mean uncertain supply and higher relative prices.

Coal you can be sure of. There will be a plentiful supply for many centuries to come. And the price advantage that makes coal a most economical fuel today is likely to grow with every passing year.

COAL
FUEL OF THE FUTURE

Chesapeake and Ohio Railway

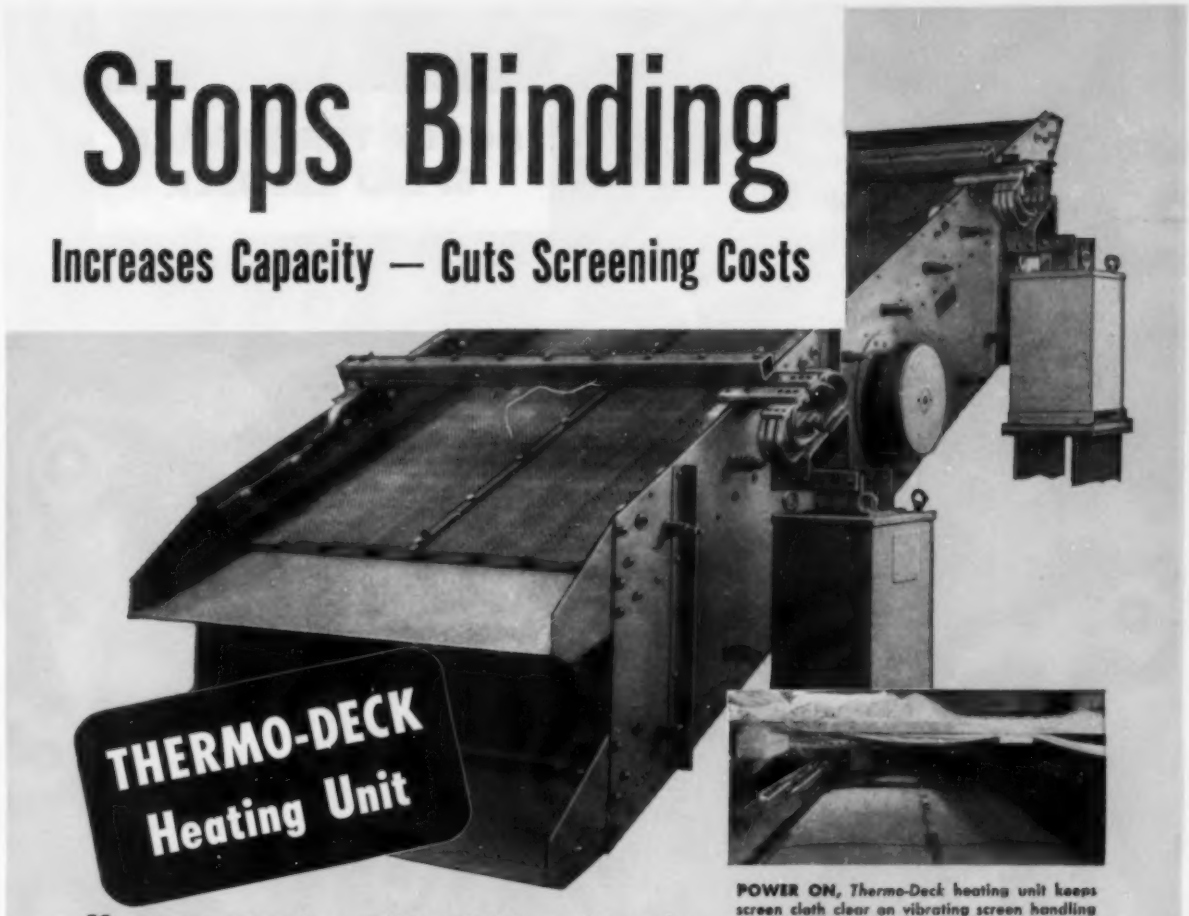
Bring your fuel problems to C & O

As the world's largest carrier of bituminous coal, the C&O is intimately familiar with every phase of coal use. We have a large staff of experts who will gladly help you to locate the coal best suited to your needs; to help you use it most efficiently; to help get it to you promptly.

Write to:
Coal Traffic Department
Chesapeake and Ohio Railway
2119 Terminal Tower
Cleveland 1, Ohio

Stops Blinding

Increases Capacity — Cuts Screening Costs



You can screen fine, moist material *continuously* with a *Thermo-Deck* heating unit. No down time required to clear fine or medium mesh screen cloth!

Heated screen cloth remains open . . . you get *more* tonnage through the screen and better separation.

Operating records prove that heated wire cloth screens last up to three times longer than non-heated cloth, because they do not have to be pounded free of blinded material. For the same reason, you save man-hours too. These lower costs increase your profits.

The *Thermo-Deck* unit can be applied to Allis-Chalmers screens in the field. See your nearby Allis-Chalmers representative for complete details. Or write Allis-Chalmers, Milwaukee 1, Wis., for Bulletin 07B7812.

A-4272

POWER ON, *Thermo-Deck* heating unit keeps screen cloth clear on vibrating screen handling fine, moist material.

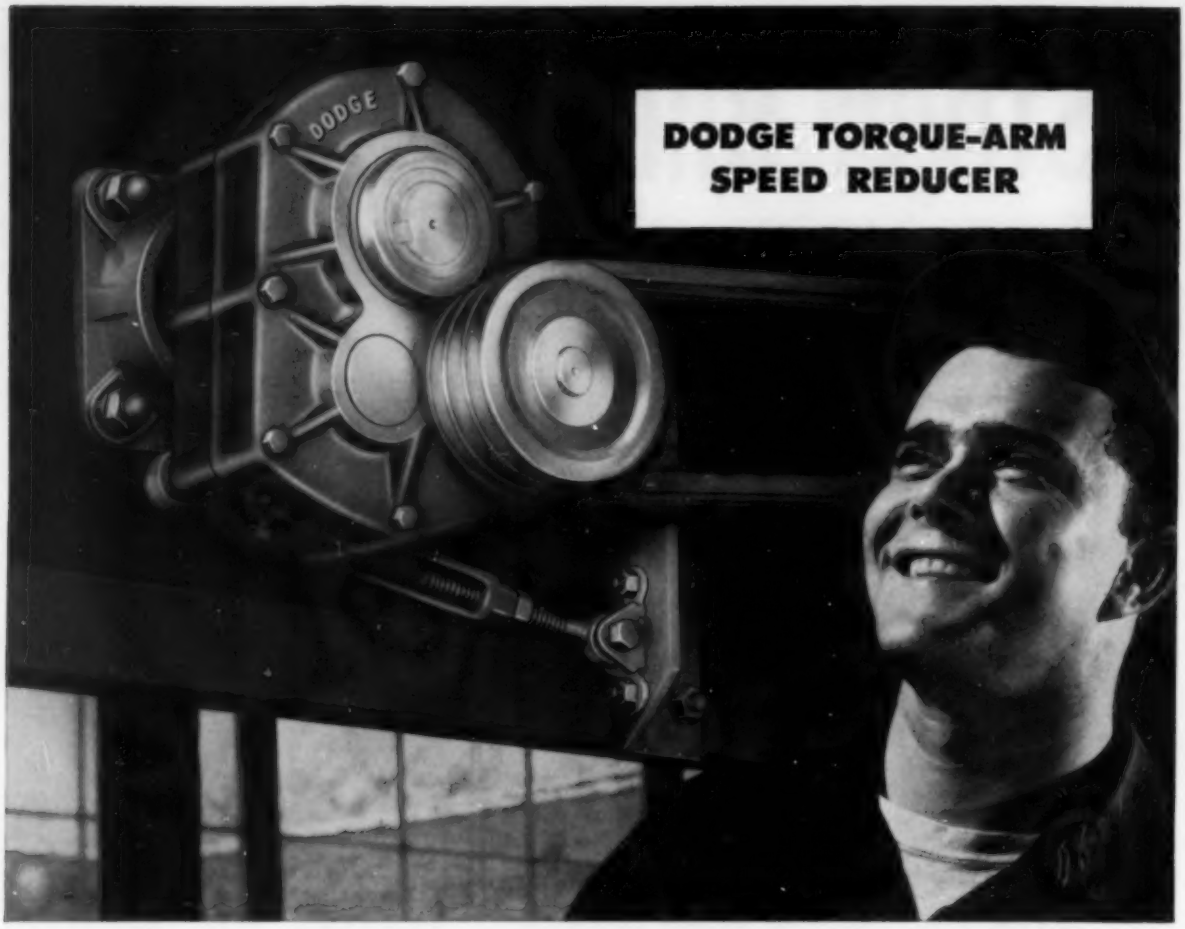
POWER OFF, troublesome blinding occurs. This view shows same screen as above, with *Thermo-Deck* unit shut off.

For Intermittent Feed... ADD A *STA-KLEEN* DECK

If feed is intermittent, fine material may bake on the wire cloth during interruptions in feed. Heat which ordinarily is absorbed by moist material increases the temperature of the wire cloth sufficiently to cause any fine material to bake on. The addition of a *Sta-Kleen* deck effectively prevents this. Bouncing rubber balls between the screen cloth and a ball retaining deck clear the cloth of baked-on particles.

ALLIS-CHALMERS

Thermo-Deck and *Sta-Kleen* are Allis-Chalmers trademarks.



Costs less - Delivers more!

Savings up to 33% . . . efficiency up to 97% . . . are yours with this new and better kind of speed reducer. Proved in tens of thousands of installations, in all types of industry!

This reducer is mounted directly on the driven shaft. No foundation, no flexible couplings, no sliding base required. No lining up difficulties. The torque-arm, fastened to any fixed object, anchors the reducer. Unit is driven through any V-belt drive. Stock Taper-Lock Sheaves prescribed for each job. Tri-Matic Overload Release and Backstop are available if desired.

Torque-Arm Speed Reducers are sold from Distributor's stocks—in single reduction and double reduction series—with capacities from 1 to 43 hp and output speeds from 12 to 330 rpm. Standardize on this modern idea in speed reduction—it saves you money.

DODGE MANUFACTURING CORPORATION, 3000 Union St., Mishawaka, Ind.

DODGE
of Mishawaka, Ind.

TAPER-LOCK SPROCKETS AND DODGE ROLLER CHAIN

TAPER-LOCK SHEAVES

DODGE-TIMKEN PILLOW BLOCKS

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

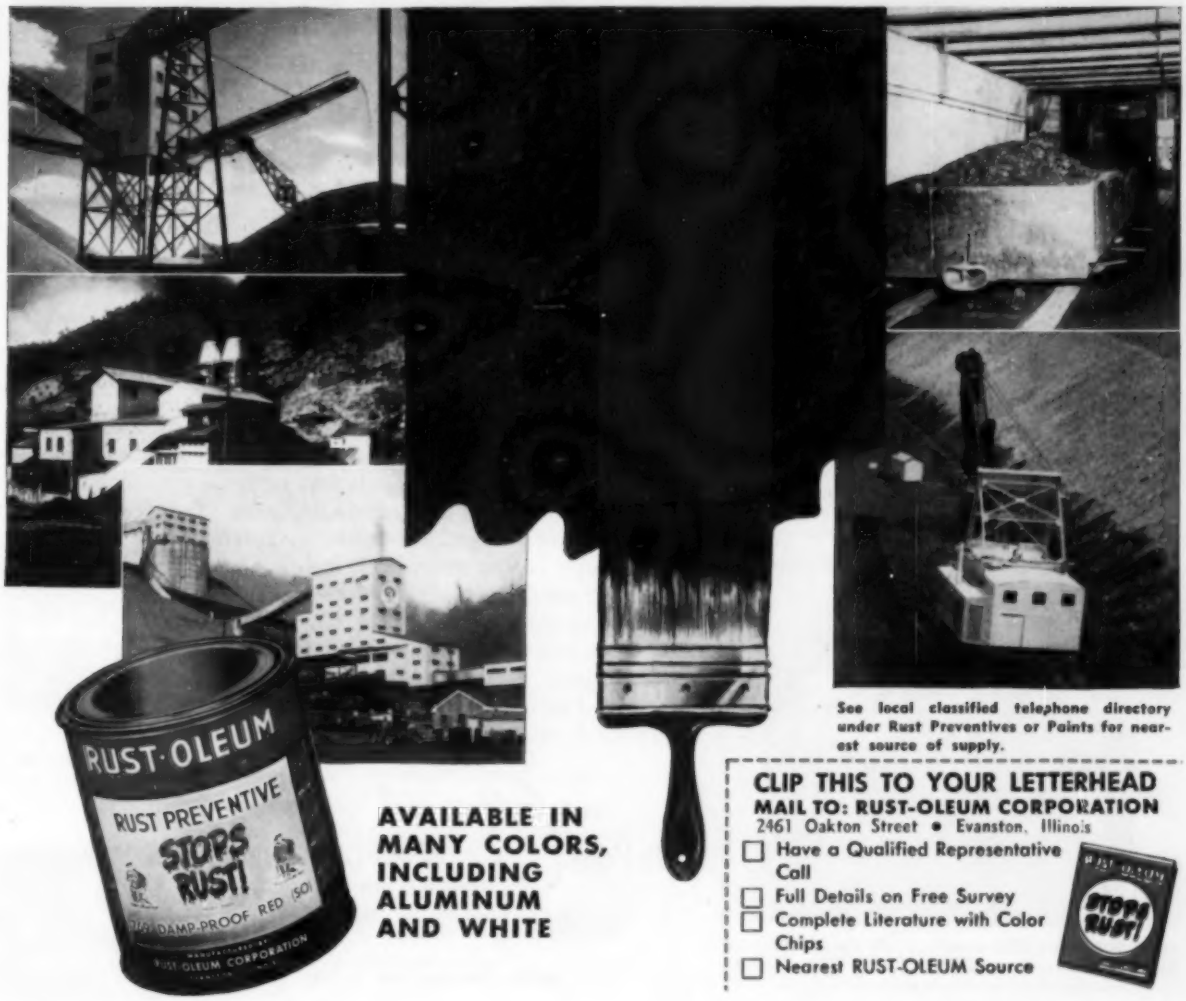
STOP RUST! with RUST-OLEUM®

BEAUTIFY AS YOU PROTECT YOUR RUSTABLE METAL SURFACES

Save costly tipples, machinery, draglines, coal cars, pipes, etc., in underground or strip mine operations. *STOP RUST* with RUST-OLEUM . . . and beautify as you resist moisture, fumes, weathering and many chemicals. Apply *directly over sound rusted surfaces* after scraping and wirebrushing to remove rust scale and loose particles. Get the facts, now! Prompt delivery from Industrial Distributors in principal cities of the United States and Canada.

RUST-OLEUM CORPORATION
2461 Oakton Street • Evanston, Illinois

APPLY DIRECTLY OVER SOUND RUSTED SURFACES

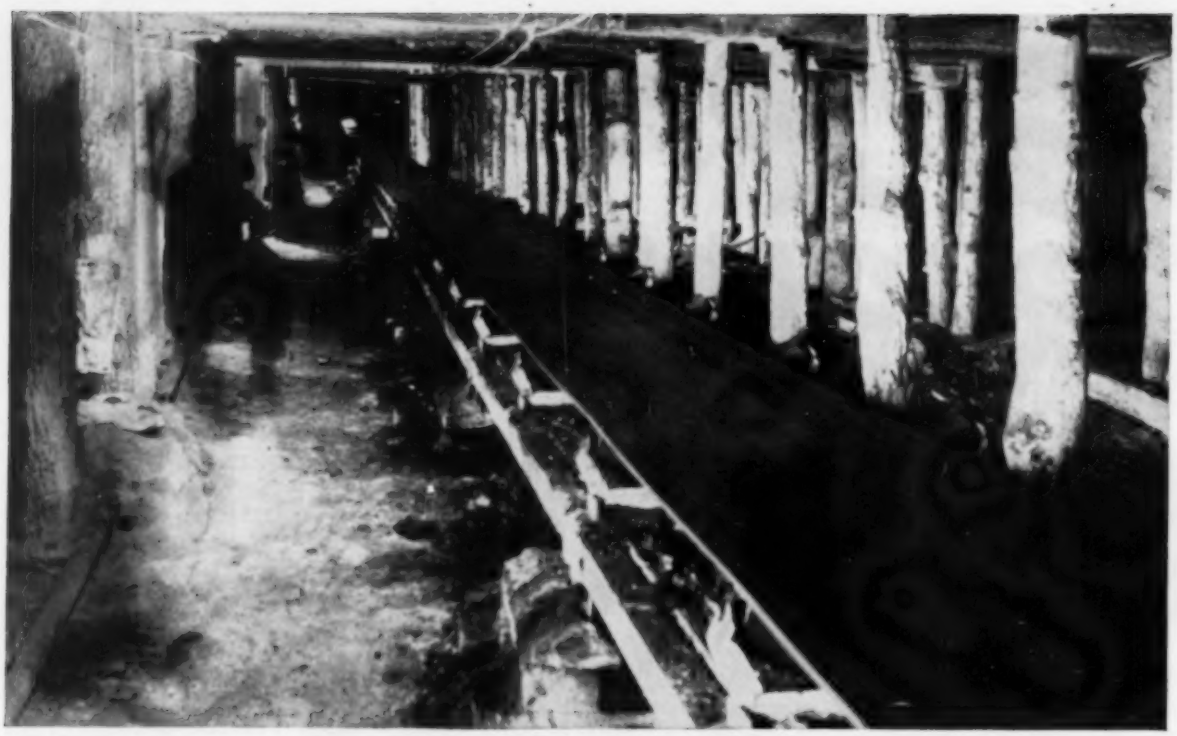


AVAILABLE IN MANY COLORS, INCLUDING ALUMINUM AND WHITE

See local classified telephone directory under Rust Preventives or Paints for nearest source of supply.

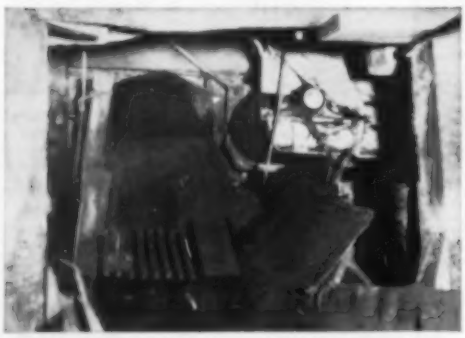
CLIP THIS TO YOUR LETTERHEAD
MAIL TO: RUST-OLEUM CORPORATION
2461 Oakton Street • Evanston, Illinois

- ☐ Have a Qualified Representative Call
- ☐ Full Details on Free Survey
- ☐ Complete Literature with Color Chips
- ☐ Nearest RUST-OLEUM Source



At Warner Collieries' Betty Mine... **Belt reinforced with "Cordura" rayon trains perfectly . . . loaded or empty**

STRONGER AND THINNER, this rayon-reinforced belt is 1,750 feet between centers. Driven by a 40-horsepower motor, it travels at a speed of 390 feet per minute.



CROSS BELT DUMPS LOAD on mother belt (as shown above). Despite this drop, the rugged "Cordura" reinforced belt has given trouble-free service during three years of use.

The picture above shows the mother belt in the Betty Mine, Warner Collieries, Mammoth, W. Va., moving toward the mine entry unloaded. At left is a view of the same belt heavily loaded. According to Willard Smith, veteran operator, the belt trains perfectly whether loaded or empty. The 30" belt was manufactured by Goodyear Tire & Rubber Co. of a 4-ply carcass of Du Pont Cordura* High Tenacity Rayon.

Belts reinforced with "Cordura" have greater strength, because "Cordura" rayon yarn is inherently stronger than natural fiber yarn. It is made of continuous strands with no loose ends to pull apart under stress. Stretch is reduced to a minimum. "Cordura" permits a thinner . . . yet stronger . . . belt, which is naturally more flexible, sits more snugly on the center idler, and thus trains better under any operating conditions.

Find out about conveyor belts made with "Cordura" yarn. We'll be glad to send you the names of suppliers . . . also give you full information about "Cordura" in the booklet "Sinews for Industry." Write for your FREE copy to: Textile Fibers Dept., Room 2520-C, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Draw to these three...

THEY'RE ALL JALTEN!

J&L's New JALTEN series enables you to select low-alloy, high-strength steel in the following combinations of advantages:

JALTEN No. 1 — High strength, good formability and fabricating—good resistance to low temperature impact.

JALTEN No. 2 — High strength, moderate forming—improved resistance to atmospheric corrosion.

JALTEN No. 3 — High strength—improved resistance to abrasion.

Remember to specify JALTEN High Tensile Steel for

- **HIGH STRENGTH**
- **RESISTANCE TO CORROSION**
- **GOOD FORMABILITY**
- **RESISTANCE TO ABRASION**

J&L STEEL

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

The data you want is in this book:

- Chemical Properties of Jalten
- Mechanical Properties of Jalten
- Jalten Equivalents
- Jalten Application Data

Jones & Laughlin Steel Corporation
Dept. 411, 3 Gateway Center, Pittsburgh 30, Pa.

Please forward a copy of your booklet, Jalten low-alloy, high-strength steel.

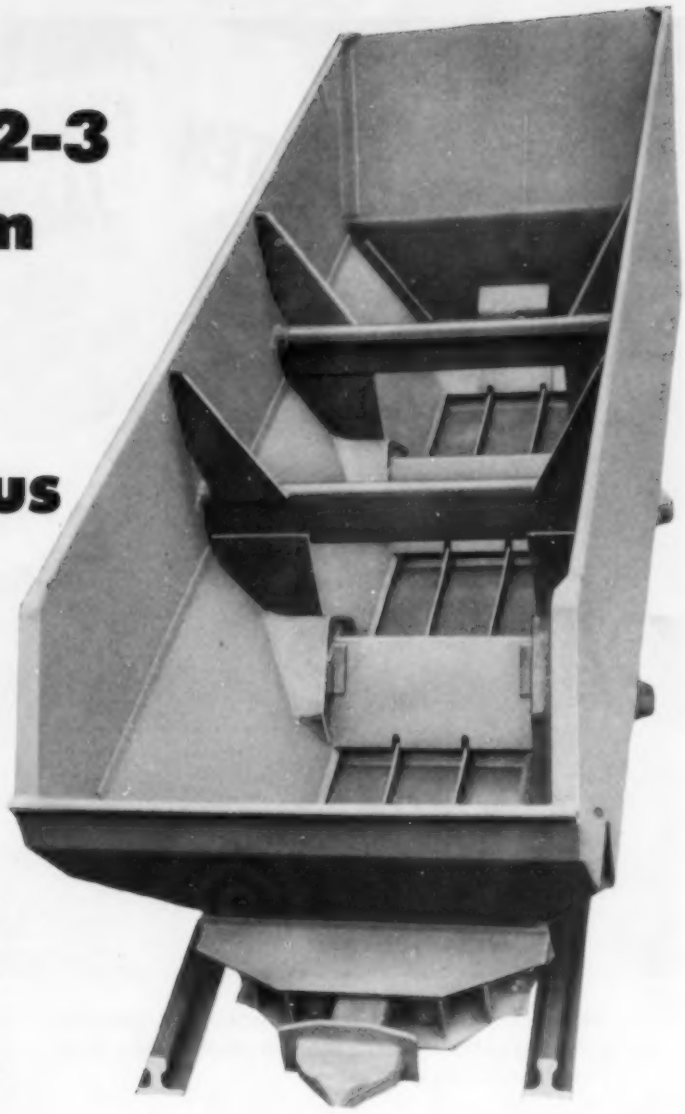
Name_____

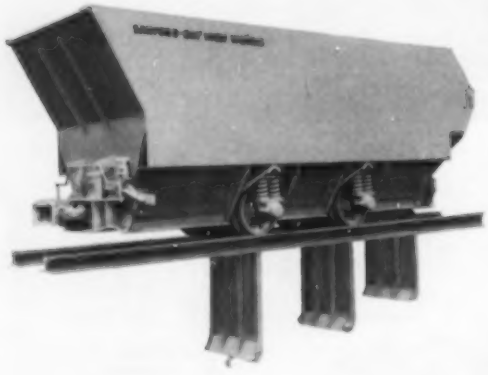
Company_____

Address_____

New S-D 1-2-3 Drop Bottom Automatics to haul diatomaceous earth

Non-Stop!





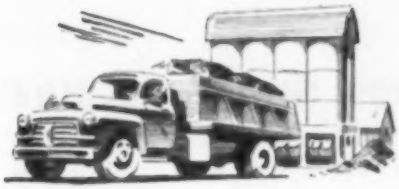
Bottom of this S-D Drop Bottom Automatic is completely sealed against dust leakage.

This is one of the new S-D 1-2-3 Automatic Bottom Dumping Mine Cars just completed to haul diatomaceous earth, non-stop, at an underground mining operation in California. This installation is brought to coal operators' attention to show that many metal and non-metallic mines, as well as coal mines, are changing over to S-D Sealed Automatics for lower cost haulage.

These cars were selected in a modernization program to speed haulage and reduce costs. They are to replace gable type cars. In this particular operation, the S-D 1-2-3 Automatics offered these needed advantages: (1) They will fill bins completely. Doors on these cars open in order (1-2-3) as the car moves over the bin and will fill the bin to track level. (2) They will eliminate the worst of a bad dust problem because S-D Automatics do not dump, they lay their load down. (3) They will haul maximum capacity loads. Short 12-car trains required big tonnage cars. The capacity of each of these S-D Automatics is 322 cu. ft. (4) They will speed-up haulage because S-D Automatics dump on-the-move and, in addition, this particular car has overlapping ends to avoid costly track cleanup caused by spillage between cars when loading in train. (5) Furthermore, these cars are completely sealed against all dust leakage. Track cleanup is practically eliminated. Cars are equipped with automatic couplers and spring-mounted trucks. S-D Automatics can be built in the size and design to meet your requirements. This particular car is approximately 6 feet high, 5 feet wide and 15'6" long. For complete information on S-D Automatics, write us today.

SANFORD-DAY IRON WORKS, Knoxville 9, Tenn.

Eaton 2-Speed Axles save engines, keep trucks on the job, reduce operating and maintenance costs, make trucks last longer



More than two million
Eaton Axles in trucks today!
For complete information, see your truck dealer.

Eaton 2-Speed Axles double the conventional number of gear ratios, enabling drivers to select a ratio to deliver pulling power or speed—the ratio best suited to road and load conditions. Engines operate in their most efficient and economical speed range, reducing stress and wear on engine and power transmitting parts, holding operating and maintenance costs to a minimum, adding thousands of miles to engine and over-all vehicle life. Eaton 2-Speed Axle trucks haul more, faster, longer, at lower cost—are worth more when traded in.

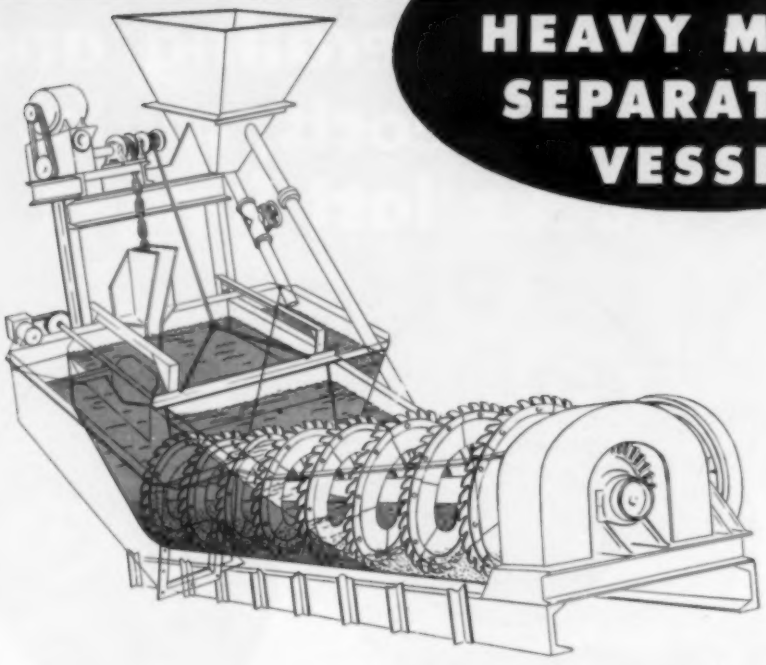
EATON
2-Speed Truck
AXLES

Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

PROVED ADVANTAGES OF

AKINS HEAVY MEDIA SEPARATORY VESSEL



THREE PRODUCT SEPARATION IN ONE MACHINE

When a separate sink float and middlings product is required to improve recovery or metallurgy, a single Akins Vessel can be used. The inherent nature of the Akins Vessel causes a zone in which the specific gravity of the suspended medium is higher than average. The rotation and forward movement of the spiral results in a so-called high density eddy, and when medium is added at two different points, float is prevented from traveling forward to the middling zone, and the middling particles are separated from the sink product since they are unable to remain submerged in a media of higher specific gravity. Two separate overflow weirs are provided to handle the float material and the middling material. The true sink material discharges from the vessel in the standard way.

Other Outstanding Advantages of Akins

Entire vessel is visible and accessible.

Variation in feed rate or grade of feed is not detrimental.

Large pool area and volume facilitates better recovery of values from fine sizes.

Circulation of media at lower gravity and viscosity.

Gradation of gravity and viscosity from feed entry point to sink removal point provides natural cleaning of sink.

No interference of product discharge.

Akins—the ORIGINAL spiral type classifier.

COLORADO IRON WORKS CO.

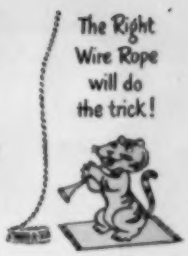
1624 17th Street • Denver 2, Colorado

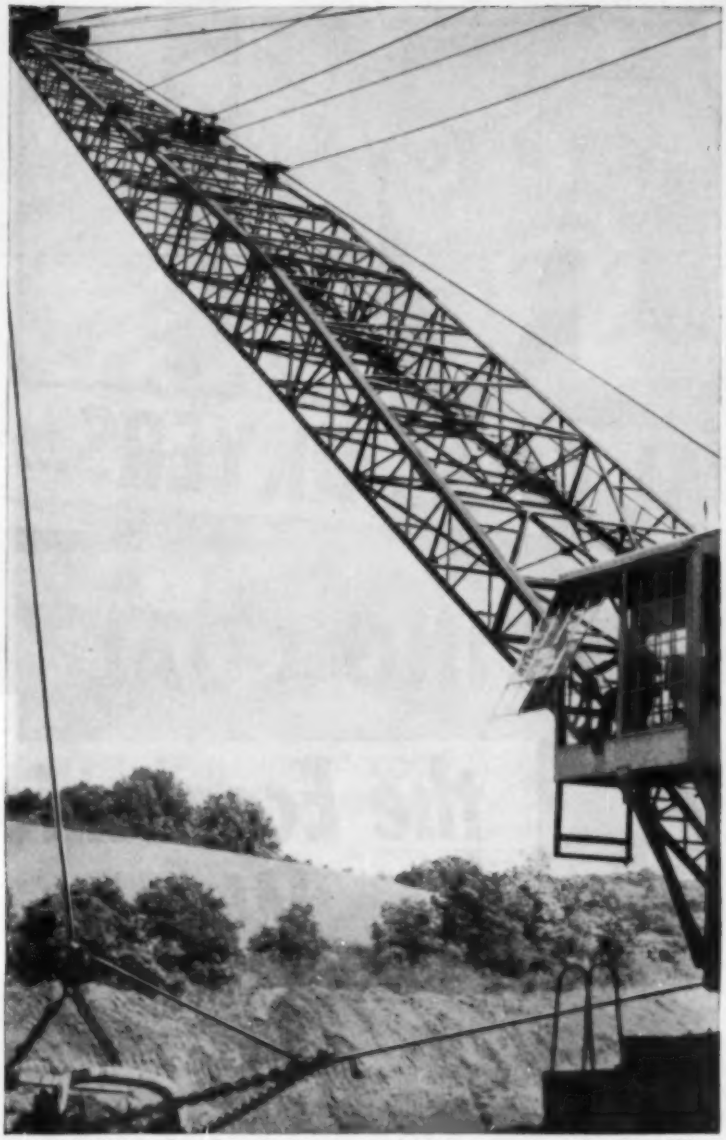
AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.

TROUBLE-FREE SERVICE around the clock from Tiger Brand Drag Rope





ASSURE YOURSELF of good service from your wire ropes—consult an American Wire Rope Engineer regularly.

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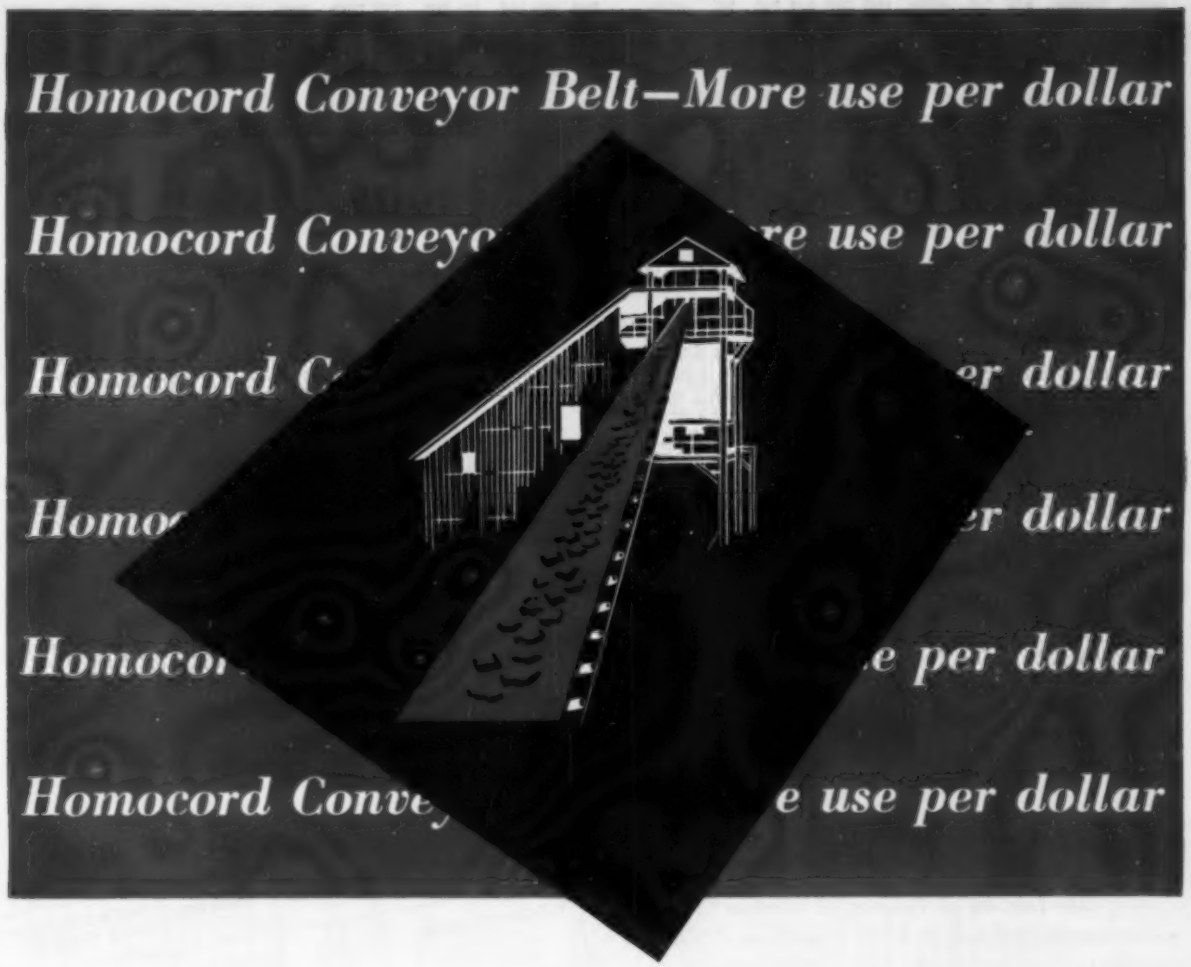
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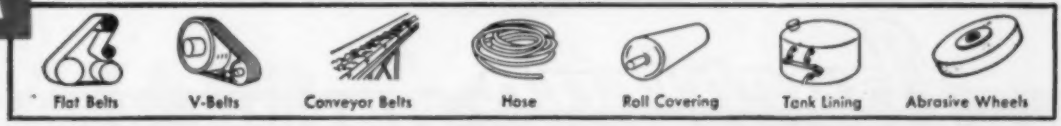

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the story of 61,000,000 tons of coal crushed at less than 1¢ per ton!

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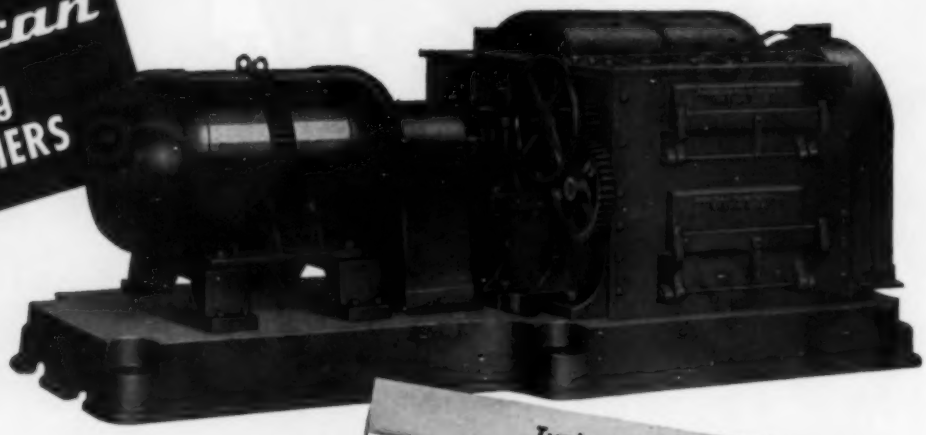

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Total Tonnage Handled .....61,000,000 Tons
Average Age of Crushers .....9.5 Years
Replacement Parts (Including Standby Parts)
1/10 of 1¢ per Ton

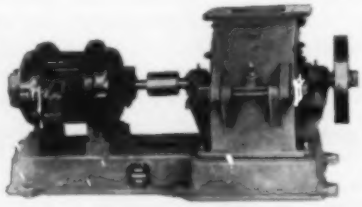
There can be no better proof of American's superlative endurance and economy of operation!

Typical Survey Results

LOCATION	CRUSHER	TONNAGE	PARTS REPLACEMENT COST
N. J. Central Station	42-S	6,000,000 Tons	$.00025 per ton. 20-year-old installation!
W. Va. Industrial Power Plant	38-S	10,008,000 Tons	$.0008 per ton. 10 years in service!
Illinois Coal Mine	AC3-E	4,000,000 Tons	$.0005 per ton for 10 years service!
W. Va Coal Mine	38-S	2,514,000 Tons	$.0007 per ton. 23 years old!
Ill. Power Plant	42-S	2,950,000 Tons	$.0004 per ton. 6 years in service.
	AC3-E	4,000,000	$.0005 per ton for 10

. . . and for low-cost coal sample crushing

Model 15 x 9 American Sample Crusher (one of several sizes) with capacities up to 2,000 lbs. per hr. Can be equipped with American Adjustable Sampling Hopper, for a 5%-10%-15% or 20% sample of a sample.



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Originators and Manufacturers of Ring Crushers and Pulverizers

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versatility for mine feeder installations

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Hazard Mine Power Feeder Cable conductors are covered with Semicon tape to prevent internal corona cutting. The Keystone high-voltage insulation is resistant to heat, moisture and ozone, giving maximum service life under all conditions. Cable tape on each insulated conductor is colored for permanent identification. Copper shielding tape provides ground fault protection over each conductor, and bare ground wires in contact with the shielding assure low-resistance ground in the event of shielding failure or ground fault in the equipment.

Hazaprene ZBF fillers in the interstices prevent wicking-in of moisture and make possible a tight-fitting, compact construction that will resist abuse and improve flame resistance. A Hazaprene ZBF sheath overall protects the cable against abrasion, moisture and other dangers of mine service.

Complete information on Hazard Mining Cables is available from your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

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HAZARD *insulated cables*

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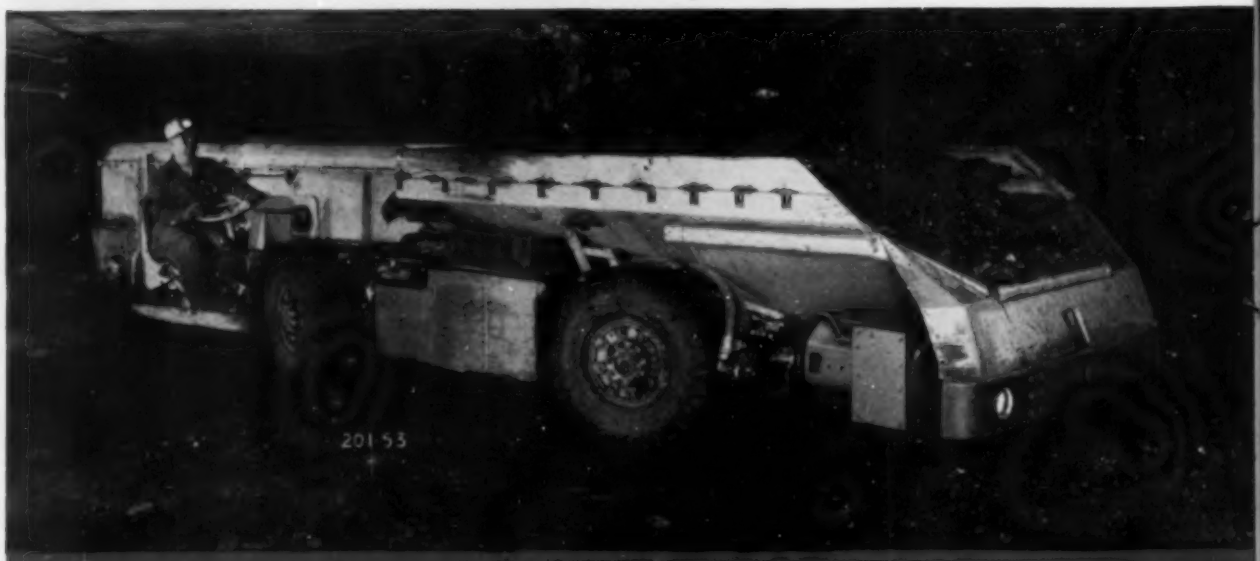

MT66 SHUTTLE CAR, 48" high including sideboards, en route to main haulage system. Operators find Jeffrey cars easy to handle. Model MT66 range is 30" to 42" basic height.

MT68 SHUTTLE CAR, 24" high, gives rapid service from face to conveyor or mine car in low coal. Height may be increased to 30" by use of sideboards.

STANDARD EQUIPMENT

Hydraulic 4-wheel steering
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Hydraulic conveyor drive, instantly reversible, two-speed
Hydraulic elevating discharge conveyor
Hydraulic cable reel
Progressive series parallel traction control with hand-selective series position
Sealed beam headlights (150 watt) mounted at each end of car
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Models MT 66-MT 67-MT 68

JEFFREY SHUTTLE CARS

Keep your eye on Jeffrey Models MT66 . . . MT67 . . . MT68—a trio of fast, powerful, cable reel shuttle cars, designed for rugged service, high capacity and easy steering under every mining condition.

Now . . . Jeffrey offers a complete line of shuttle cars in 24" to 54" basic heights. Their speed and flexibility will save time from loader to main haulage system . . . will increase loader efficiency . . . will cut your mining costs.

Check these ***distinctive, standard*** features:

- ***Instantly reversible conveyor*** enables operator to clear jammed lumps.
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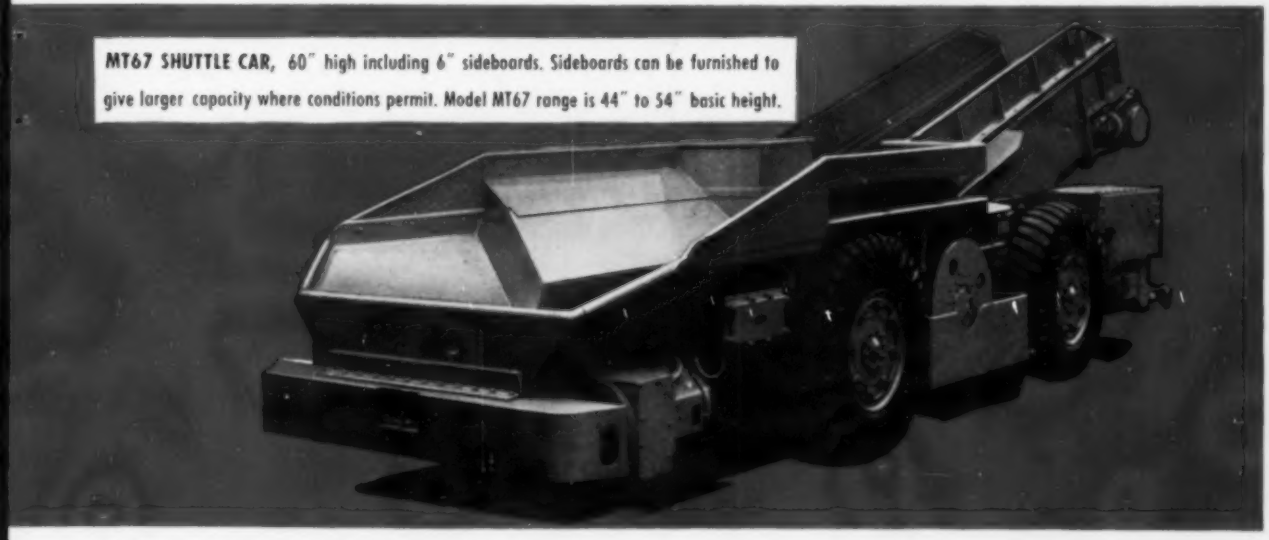
All Jeffrey shuttle cars have 4-wheel drive and 4-wheel hydraulic steering . . . hydraulic brakes . . . discharge conveyor hydraulically driven and elevated . . . easy-to-reach foot operated switches (operator's compartment can be located on either side).

Call in a Jeffrey engineer or write for a bulletin. Get the complete story on modern, low-cost mine transportation from the company making the finest equipment for the coal industry.



MT67 SHUTTLE CAR, 60" high including 6" sideboards. Sideboards can be furnished to give larger capacity where conditions permit. Model MT67 range is 44" to 54" basic height.

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"Then — and then only — tape your detonator snugly to the end of the trunk line, and fire with Safety Fuse or battery. Remember — *tape* it, because a good snug connection is just as important here as it is all along the line." P-19

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PROVED and APPROVED

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

MAY, 1954

IVAN A. GIVEN, EDITOR

Tomorrow Today

WHAT WILL the coal-production setup of the future be like? The general shape of the answer already is visible. It will be a setup even more firmly based on machines, with the number of operators reduced to a minimum by making every machine as nearly automatic as possible. In fact, even today, given reasonably good mining conditions and matching transportation, power and maintenance, it is quite possible for two continuous miners working two shifts to regularly produce 3,000 to 4,000 tons per day—all from a single panel. The possibility may become an actuality at a sizable number of operations in the not-too-distant future.

What, then, will be the cost and efficiency picture? The equipment cost per ton of coal will be up, along with power, maintenance and other costs involved in machine operation. But the critical cost—manpower—will be down, as a result of, say, 6 to 8 men per shift producing what now requires 20 to 30 men or more. Attainment of these levels of productivity, as noted, would be possible even today if the machines now in operation could be kept in service at rated capacity 75% of the shift time, thus utilizing the necessary manpower more fully.

Full utilization of rated capacity, meaning keeping the machine loading coal, more of the time, requires, among other things, haulage that will carry the coal away as fast as it can be produced, power at rated voltage at all times, and a machine that can stand up under continuous operation, in turn involving not only design but first-class maintenance. In fact, these are today's considerations, as well as tomorrow's. If, for example, a loading machine that could produce 500 tons per shift turns out only 400 tons, the difference in labor cost at the face with a 10-man crew would be approximately 10c per ton. Or to put it another way, if the desired daily output was 2,000 tons, it could be produced with 40 instead of 50 man-shifts, making the daily saving approximately $200 and the annual saving, on a 200-day basis, $40,000. If this saving was not made, it would be fair to say that the operation was suffering a loss of $40,000 a year.

This leads to the conclusion that a loss is really a lot more than what it is commonly thought to be, and that looking at the picture from this angle can put things more in their true perspective when it comes to studying not only improvements in equipment but also in operating methods. "What are we losing—and what can we do to prevent the loss?" thus becomes the keynote all along the line from top to bottom in the management ranks. With that as the angle, it becomes easier to achieve the productive efficiencies so necessary today—and at the same time better prepare to cash in on the opportunities that will be provided by the new equipment of tomorrow.

Where It Lies

THE PRINCIPLES that guided operations in the past, not only in coal mining but in other walks of life, quite frequently are held to be out of date in view of today's conditions. Some are, without question, but is it necessarily true that all of them are? In the old days in coal mining, the miner was considered to be, in effect, a contractor, and both he and management accepted without question the fact that he had the job of getting the coal out and along with it the responsibility. In other words, both he and the management considered that it was up to him to do the job and do it right.

As time wore on, machines came into the picture and the industry converted to the day rate, the tendency has been to shift the burden of seeing that a good job is done to the management, particularly the face or other foreman. But the man still is hired to do a job and is paid for it. Therefore it is logical to hold him responsible. Maybe the old principle still is the best one, and if it isn't being followed it should be resurrected for the benefit not only of the company but of the supervisors and the men as well.

Key factors in fewer accidents and more tonnage

SAFE EQUIPMENT—Match equipment and engineering to the physical demands and hazards of the job, whether above or below ground.

SAFE PRACTICES—Minimize natural and mechanical hazards by developing and encouraging safe methods among all workers.

SAFETY-MINDED MEN—Without them, no company can reap the benefits of investment in safe equipment and the development of safe methods.

Cutting Cost With Safety

Three guides to more safety and higher efficiency:

EQUIPMENT to mechanize mining and guard men and property

METHODS that reduce hazards and get most from machines

MEN who are sold on safety and practice its principles

BETTER SAFETY GUARDS LIFE AND LIMB. But it also does more. It lifts efficiency and brings real dollar savings, and puts money in the bank.

Look at the record of one company, for instance:

In the 5-yr period from 1949 to 1953, that company, winding up a changeover from handloading to full machine mining, boosted its efficiency over 40%, from about 6 to 8.5 tons per man-day. In that same period, the accident-frequency rate fell from 45.8 to 7.5; severity rate, from 14.4 to 5.3. Significantly, the big boost in efficiency did not come until safety training was started near the middle of the 5-yr period.

With the miner's daily wage rate at $14.05 in 1949, the company's direct labor cost in that year was in the order of $2.35 per ton; in 1953, with the wage scale up to $18.25, labor cost came to only $2.15 per ton.

Go along a little further with this same company. In 1949, with a rate based on accident experience, the company paid compensation charges of $1.64 per $100 of payroll. Suppose the payroll was $25,000 per week. Compensation charges in 1949, then, were $410 per week. Between 1949 and 1953, wage rates and therefore weekly payrolls rose about 30% to, say, $32,500, while the compensation levy dropped to $1.12 because of improved safety. Compensation costs in 1953, therefore, were about $364 per week, or $46 less than in 1949.

In short, it comes down to this:

1. Safety and efficiency go hand in hand. Improvement in one boosts the other.

2. Money spent on safety is money well invested.

Spending Money and Getting Results

SUPPOSE SAFETY DID COST MONEY, on balance. Even then, the easing of pain and the banishment of accidental death would be worth the price.

But, as pointed out, investment in safety doesn't create deficits. It pays dividends.

At the outset, let it be said that cash outlay is only one measure of a company's devotion to the cause of safety. And no amount of money will produce satisfying results unless that money is backed up by a painstaking study of safety needs, creation of a program geared to those needs, intense and timely training, high worker morale, all-out support from top officials, cooperation by workers and their union, effective foremanship, and safe machines, equipment and methods.

Even so, here are a few figures that tell the dollars-and-cents story for three well established companies with excellent safety records:

COMPANY A—From 1950 to 1953, expenditures for salaries in the safety department, up from $14,539 to $18,573 per year; for safety equipment and supplies, up from $3,846 to $7,992 per year. *The Payoff:* Frequency rate down from 29.50 to 9.20; severity rate, down from 12.24 to 3.48.

COMPANY B—Expenditures for safety equipment and supplies in 1953, $5,204, or 0.23c per ton. *The Payoff:* From 1949 to 1953, frequency rate down from 45.8 to 7.5; severity rate, from 14.4 to 5.3.

COMPANY C—From 1946 to 1953, expenditures for safety-department salaries and incidental safety activities, up from 0.4 to 1.7c per ton, not including money spent for improving mining conditions, buying safer equipment, guarding machines and other purposes. *The Payoff:* From 1946 to 1953, frequency rate cut from 85.51 to 33.96; number of lost-time accidents down from 444 to 142 per year; number of fatalities down from 7 to 1 per year; compensation costs lowered from 6.3 to 4.2c per ton, in spite of two increases in compensation benefits totaling about 65%.

The above are positive gains in safety, established at negligible dollar cost but at the expense of substantial pains in training and safety promotion. In addition, these three companies, assuming they hold or improve their present standing, no longer have big worries about the following:

1. Cost of re-opening a mine and repairing machines and equipment following explosion, fire or flood.

2. Cost of down,time and lost tonnage, incurred wnen frequent accidents shut down a mine or a section.

3. Cost of fast labor turnover, incurred when workers, job-trained at considerable expense, seek jobs in safer mines.

4. Cost of processing complaints and grievances growing out of unsafe machines, methods and working con-

conditions and taking valuable time from safety and labor-relations men.

5. Cost of investigating an excessive number of accidents and processing compensation claims.

6. Cost of low morale among workers, reflected in loss of efficiency.

7. Cost of customers lost because of unfavorable public relations growing out of a bad accident record.

Investing Dollars for Safety

EQUIPMENT, METHODS AND MEN are the three essential ingredients of safety, as the above achievements of Companies A, B and C show. In other words, the approach to safety must be both physical and mental. Safe equipment and materials must be provided but they cannot produce results unless men, convinced of their indispensable role in safety and of the benefits safety brings them, use their equipment and materials safely, employ safe mining practices, stay on the alert for hazards and correct unsafe conditions and methods promptly.

What can be done to improve safety on the physical side?

Here are a few helps on how to get the most in safety from equipment and materials:

1. Purchase, installation and adaptation of equipment and materials—Weighing the risks of accident against the cost of precautions, it is cheaper to buy and install only permissible equipment and supplies for use in underground mines and dusty surface installations; provide proper grounding for all surface and underground electrical equipment; equip mine cars with automatic couplers; use specially designed man-trip cars; provide safe loading stations and adequate clearances, especially for men traveling on belts; build crossovers above track and belts; provide guards to protect men from drive-chains and pulley belts, grinding wheels, rotating augers and the like; and build handrails and guardrails wherever they will add to safety.

In many instances, slight and inexpensive adaptations enhance machine and equipment safety. For instance, at one deep mine footguards and handrails added to shuttle cars provide simple but effective protection for drivers (*Coal Age*, October, 1953, p 112). Elsewhere, in a strip mine, a specially constructed swivel protects high-voltage cable in the pit (*Coal Age*, February, 1953, p 116).

2. Ventilation – Scrapping an old fan and investing in a new one of modern design and high efficiency will provide more air—and therefore more safety—for the same cost or the same quantity of air at lower cost.

To keep air costs down, circuits should be kept free, open, straight and constant in cross-section. Keeping standing trips out of airways also lowers the cost of ventilation. Roof bolts, by eliminating timbers, keep power consumption low.

Ventilation power consumption also can be reduced by exhausting spent air through outlying shafts, boreholes or drift openings. Leakage, which accounts for substantial power waste, can be minimized by reducing the number of doors and, instead, building overcasts. As for permanent stoppings, air-tight brick or concrete structures are cheaper over the long run than rough wood. Ventilation labor costs can be cut measurably by installing automatic doors and providing centralized automatic monitoring for fans (*Coal Age*, October, 1951, p 87).

3. Underground haulage—In mines with rail haulage, essentials for safety plus low cost over the long run are rails of sufficient weight to carry the traffic, together with workmanlike installation and maintenance to prevent derailments; dependable mine cars and locomotives with automatic couplers, running lights and warning signals; skillful traffic control through suitable communications and block signals; safe clearances, top and sides, with frequent safety holes recessed into the rib; protected cabs for motormen and tripriders; and specially built man-trip cars. Bigger locomotives and mine cars, besides increasing efficiency, also reduce exposure to hazards by reducing the frequency of trips. Likewise, new methods of sinking shafts and driving slopes now provide ways to cut man-trip time, thus reducing travel distance and minimizing exposure to hazards; and also to build additional escapeways to be used in case of fire or explosion.

With shuttle-car haulage, steering, brakes, lights and warning signals need careful and regular maintenance, not only to avoid collision and loss of control but also for capacity haulage and conservation of time. Rib overhangs, posts out of alignment, crowded turns and blind spots along the haulage route can cause costly accidents. Transparent plastic curtains and swinging doors are a protection against broken necks and buggy collisions, both of which cost money.

In belt mines, automatic controls that stop belts in emergency usually will pay for themselves if they prevent one bad rip. Good housekeeping, a big factor in efficiency as well as safety, requires that spillage and debris be kept cleaned up, thus reducing the danger of belt fires and other damage to the belt. Frequent checks on belt tension not only insure efficient use of power but prevent slippage and friction, the cause of many belt fires. Today, at some increase in cost above standard materials, non-flammable belts are available. The premium price, however, is insurance against fire.

4. Controlling roof – Roof control costs less than neglect because over and above possible loss of life, roof neglect means interrupted face time, damaged machines, haulage slowdowns, broken power circuits and time lost in cleanup and repair.

Though bolting sometimes costs a little more than conventional wood timbering, in most instances it holds roof longer, thus averting the need for retimbering; provides maneuvering space for machines and haulage units, thus speeding transportation; offers no resistance to air currents, thus cutting the cost of ventilation; and holds roof securely, thus lessening the danger of accident.

The companies that achieve safety, avoid unnecessary costs and improve their efficiency through roof control are the ones that keep their roof characteristics under continuous study, develop and enforce sound standards of timbering or bolting and keep abreast of new methods and equipment for controlling roof. They work on the principle that a dollar saved by skimping standards may cost several thousands in compensation and other costs.

5. Preventing and fighting fires—However much money a company may spend to prevent fires, it is not likely to be as much as it would cost to extinguish a fire and repair the damage.

In fire prevention, good housekeeping, plus workmanlike installation of machines and equipment, frequent inspections and regular maintenance are the starting points of safety. All these are low-cost procedures. They need to be backed up by such equipment items, to mention only a few, as fire-resistant cables, well spliced and adequate in size; safety circuit centers; water connections, with proper fittings and nozzles; slip switches that cut power if the belt fouls; extra applications of rock dust near bare

conductors and head and tail pulleys; and fire-fighting equipment in accessible, well-marked places.

6. Allaying dust—Water costs little but it still is the best agent known for keeping coal-dust hazards at a minimum. Sprays on cutterbars, loading machines and the cutting heads of continuous miners, at belt and shuttle-car transfer points and at dust-emission points in dry-type preparation plants keep dust well within safe limits at little cost.

For coal dust collected on the mine floor, on timbers, on machines and elsewhere, rock-dusting is the only safe procedure. How much rock dust? Any rock dust in excess of minimum requirements (65% incombustible material—and even higher if methane is present—and to within 40 ft of the face) is on the side of safety and prudence.

7. Blasting—In underground and strip-mine shooting, safe procedures already are well established—permissible explosives, safe transportation and storage for explosives and flammables, limits on quantities of explosives kept underground or in the pit, non-combustible material and non-sparking tamping rods for stemming and adequate warning to men working close by.

However, shooting a face next to a thin pillar can be disastrous. That's why a little money spent on frequent survey lines may save the cost of an accident.

8. Electricity—In deep mines, strip mines and preparation plants, first-class power distribution pays off two ways. It lifts efficiency and it protects men, equipment and property.

Equipment and methods for safe use of power underground and on the surface include the following, to mention only a few: adequate grounding of electrical equipment and installations; instantaneous automatic circuit-breaker protection against faults; permissibility for all equipment used in dusty places; sectionalizing to localize outages and hazards; iron-clad rules for inspection and maintenance; fireproof substations and distribution centers; guards for bare wire; painstaking cable splices, with provision for replacement of cable that has been spliced too often for safety; insulating mats in front of switchboards, distribution centers, etc.; switchboard and control-panel devices to protect men working on lines and equipment; special underground rooms, sealed off and separately ventilated, for transformers, m-g sets, rectifiers, etc.; and cable-handling methods that eliminate stretching, bending and pinching cable beyond reasonable tolerances.

9. Inspection and maintenance—Flaws revealed by regular inspection and maintenance in underground, strip and plant equipment and materials, and corrected at once, prevent accidents and insure against major breakdowns and interruption of the flow of coal for long periods.

10. Strip-mine haulage—Fast, capacity haulage with maximum safety is an attainable goal in strip-mining.

Starting point, of course, is selection of equipment. Since few strip mines are alike, every stripper must choose trucks to suit his unique needs. Within the last few years new features such as torque converters, power brakes and power steering have added substantially to haulage safety and efficiency.

Money spent on good roads, second ingredient in strip-mine safety and efficiency, is money well spent. Grades, curve radii, width and slope from crown to edge, with the possibility of "steps" to prevent engine racing on downgrades, are factors to weigh in building roads, as are base and top materials and provision for drainage. From there on, maintenance is the major consideration. Road crews and equipment should patrol systematically, keeping potholes filled, "corduroy" stretches smoothed out, slides cleaned up and washouts repaired.

Third ingredient is inspection and maintenance of haulage equipment. In this, driver and mechanic play roles of equal importance—the driver because he knows whether his truck performs well and the mechanic because he knows how to bring performance up to standard. Driver and mechanic should keep an eye on brakes, steering mechanism, hydraulic system, tires, cooling system, electrical wiring and lubrication.

Fourth ingredient is selection, training and supervision of drivers. Like all operators of mobile equipment, above and below ground, drivers should be selected on the basis of aptitude, speed of reaction, physical ability and attitude toward the job. Compared with the cost of unsafe driving, it is a sound investment to train and retrain drivers in traffic laws and local rules of the road, fire prevention, first air, safe pit practices and safe fuel loading.

11. Shop and preparation-plant safety—Safety in shop and plant costs little but the rewards are satisfying.

At little cost, safety can be built into electrical circuits and installations; safe storage can be provided for flammables and explosives; floors can be kept clean of coal dust, oil drippings, paint, wood shavings and water; lighting can be made adequate; danger spots can be painted with standard danger colors; guards can be placed on wheels and moving machine parts; and handrails and guardrails can be erected where needed for safety.

12. Equipment for personal safety—Confidence in one's own personal safety is a builder of morale which, in turn, is an efficiency-builder. Personal safety is provided by such items as hard hats, safety shoes, dependable caplamps, regular and special-purpose gloves, kneepads, welding masks, self-rescuers and respirators.

Case Histories Show How Safety Pays

SPENDING MONEY FOR SAFETY, as pointed out, brings a double gain—a gain in efficiency and a gain in safety. That fact is borne out in the experience of many companies operating deep mines, strip mines and preparation plants.

Here are a few case histories, gleaned from the pages of *Coal Age* over the past 2 yr or so:

1. From Handloading to Machines

A Kentucky company—In a changeover from handloading to machine mining, productivity improved 75% in 6 yr. By midyear, 1953, bolstered by safety training and promotion, the company had shipped over 3,390,000 tons of clean coal without a fatality. (CA, July, 1953, p 100.)

2. Roofbolting

A West Virginia mine—Roofbolting now provides more output per loading unit, flexibility and mobility in face work and haulage, higher recovery of coal, better ventilation and lower supply-handling costs. It also makes roof safer and eliminates accidents from dislodged timbers. (CA, October, 1953, p 74.)

3. Electricity Underground

A West Virginia mine—New AC power centers replacing oil-filled substations cut substation moving time by 9/10, resulting in more frequent move-ups, better power at the face and less footage of large-conductor low-voltage cable. Power centers eliminate need for costly masonry power rooms and permit placement of power cen-

ters irrespective of direction of air flow. Fire and shock hazards are eliminated. (CA, June, 1952, p 86.)

4. Electricity Underground

A Pennsylvania mine—Modern electrical equipment, including selenium rectifier and sectionalizing equipment, provides adequate face power, enhances power-distribution safety and limits the effect of costly outages. Employee morale gets a lift from sealed-off substation rooms with automatic-closing fire doors, adequate circuit breakers, insulating cushions on floors of substation rooms, separate splits of air to ventilate substations and buried high-voltage cables. (CA, May, 1953, p 100.)

5. Re-equipping a Mine

A Far West mine—In a rebuilt and re-equipped mine, good labor relations, over 125 tons per 5-man face crew and an average of only two lost-time accidents per month result from use of a continuous miner in development work in a 40- to 46-in seam pitching 9 deg, plus the following new safety equipment: buried 2,300-v armored cable, cutout switches in each entry, first-aid stations underground, fire-fighting equipment near electrical stations, line battice up to the face, special magazines for explosives and detonators, locking devices for cutterbars, safety couplings for mine cars, full lights for trips, goggles (provided by the company), special man-trip cars and machinery guards. (CA, August, 1952, p 70.)

6. Roofbolting

An Illinois mine—Tons per man-day and coal recovery increased measurably with systematic roofbolting in a 46-in seam. Bolts, installed all the way up to the face, hold draw rock. Compressed air drives the roof drill and breaks the coal. Compressor is equipped with dust receiver and filter. (CA, April, 1952, p 74.)

7. Shuttle Cars

A Pennsylvania mine—Simple, inexpensive change in shuttle cars puts brake pedal always under right foot, regardless of which seat driver is in, thus bringing a sharp decline in shuttle-car accidents. (CA, August, 1952, p 118.)

8. Diesel Haulage

A Canadian mine—A reduction of 30% in haulage costs resulted from use of diesel locomotives for main-line haulage. In addition, unsafe open wiring and high-cost electrical installations were eliminated. (CA, February, 1952, p 94.)

9. Roof Control

A West Virginia mine—Plastic roof coating at a cost of 13c per square foot keeps entries and airways open, cuts ventilation cost, eliminates costly labor formerly used for cleanup and minimizes the danger of fire, sometimes started when roof falls bring down open wiring. (CA, April, 1951, p 90.)

10. Up-dating a Mine

An Alabama mine—Cost of injuries to miners dropped from 11c per ton in 1948-49 to 1.8c in 1952 while tons per man-day rose from 4.4 to 8.65. Improvements in safety and efficiency are credited to changeover from loading machines to continuous miners, roofbolting to within 2 ft of the face and improved housekeeping and supervision. (CA, June, 1952, p 76.)

11. Inventing Equipment

A West Virginia mine—More safety for workers, higher percentage of loading time and an increase to 15 tons per man-day in 24- to 46-in coal result from use of a company-designed three-section face conveyor for use in wide-face mining. The new conveyor permits quick moves with resetting of only two posts. (CA, October, 1952, p 77.)

12. Revised Mining Methods

An anthracite mine—Longhole mining raises tons per man-day, boosts coal recovery, cuts timber cost and labor, produces more lump coal with less rock, eliminates timbers that otherwise would block flow of coal and makes hazardous development openings up the pitch unnecessary. (CA, March, 1953, p 76.)

13. Handling Electricity

A West Virginia mine—New three-voltage AC system underground provides better voltage at the face, thus contributing to productivity of 10 tons per man-day, and is safer than conventional 275-v DC system. (CA, September, 1952, p 91.)

14. Communications

A Utah mine—New dial telephone system linking all underground and surface operations provides swift communication at low cost for fast clearance of machine outages, safe dispatching of trips, tight coordination of operations and instant organization for emergencies. (CA, December, 1953, p 92.)

15. Eye Protection

A Wyoming company—In 1933, the company began a program of eye protection. At that time, cost to the company per eye-injury compensation case was $2 per employee per year. In 1953, cost stood at only 40c. In fact, in 1949, 1950 and 1951, eye-injury compensation costs were zero. The eye-protection program, together with other safety training and promotion, enabled one mine to work 1,937,818 man-hours from Jan. 1, 1948, up to Oct. 31, 1952, without a lost-time accident. That record doubtless was extended after October, 1952. (CA, January, 1953, p 138.)

Swinging Men to the Side of Safety

MAKING SAFETY WORK, as stated earlier, requires more than equipment and materials, however essential they are. Experience bears out the fact that the mental approach to safety is even more important than the physical approach, though both must work together. In other words, men are the critical ingredients in safety—men who know the hazards of mining, practice safe methods in the use of equipment, use prescribed procedures for detecting danger and seek to make mining an ever safer industry.

To swing men to the side of safety, the following are necessary:

Teamwork
Discipline
Incentive
Training

1. TEAMWORK — Most often, teamwork for safety doesn't cost a dime. It starts with conviction by all concerned—company presidents, operating officials, supervisors, workers and the union—that safety is paramount and that the safe way is the efficient way to do a job. It is sustained by dedication that shapes up in quick action by everybody to discover and eliminate hazards and in enthusiastic promotion of safety through all available channels.

Can men be brought together in the cause of safety?

Does teamwork for safety really work?

The answer to both questions is "Yes." The evidence lies in the results of 100% cooperation to achieve 100% accident-prevention training in the tri-state area of southwestern Virginia, eastern Kentucky and southern West Virginia (*Coal Age*, December, 1953, p 66). Elsewhere, evidence is found in the stripping operations of a southwestern company. There, im-

proved morale leading to higher productivity and a better safety record have been credited to rotation of workers through month-long terms on special safety committees.

There is no fixed formula for developing and encouraging teamwork but there are some helpful guides that have brought success to a good many coal companies. Here are a few:

Assurance, borne out in deeds, that safety is the primary concern of management men from president to face foreman.

An advancing safety goal, set up and moved forward periodically after realistic appraisal of experience and analysis of what can be expected.

Periodic checkup on results, with publicity on achivements and shortcomings.

Competition, inspired by comparison of one's own company with other companies and, within a single company, by comparison of records crew by crew.

Rewards for achievement, taking shape in formal recognition or in useful prizes.

Encouragement of safety suggestions from all quarters—foremen, workers and the union.

Opportunity for miners and the union to help plan safety rules, safety programs and safety celebrations.

2. DISCIPLINE AND INCENTIVE—Discipline implies rules—rules based on experience and reason, reviewed and updated in line with changing conditions and advances in the science of mining and kept constantly before foremen and men.

In effecting rules, however, willing compliance by workers, which costs nothing, should be the aim rather than iron-clad enforcement which, though perhaps unavoidable in handling incorrigible violators, sometimes leads to costly stoppages and tedious grievance procedures.

One major key to willing compliance is incentive. Most men, foremen as well as workers, respond to such incentives as hope of long life and a sound body, security for wife and children, pride in accomplishment, desire to excell and hope of personal gain (either personal recognition or a tangible reward). It costs little or nothing to hold out these incentives.

Another major key to willing compliance is a staff of intelligent supervisors devoting their time, their mining know-how and their understanding of human nature to explaining rules, encouraging safe working habits and winning cooperation.

All this points up the need for foreman training, not only in safety procedures but also in human relations. The importance of foreman training shows up clearly in the recent confession of one supervisor. After taking a course in the psychology of safety in supervision, he said that if he only had known how to handle a certain disciplinary problem in safety, he would have avoided a 6-wk strike.

3. TRAINING—Whether formal or informal, training brings results in better safety and lower cost.

Take the case of Lone Star Steel Co., McAlester and McCurtain, Okla. Productivity increased measurably, safety improved substantially and, up to August, 1953, there had been a 10-mo period without a grievance following establishment of an active safety training program under the guidance of a full-time safety director (*Coal Age*, September, 1953, p 100). The program includes not only helpful on-the-job instruction and formal training classes in first aid, rescue and accident prevention, but also incentives for worker participation in training, familiarization of workers with safety problems, exchange of safety ideas between management and men, joint study of recurring types of accidents and joint approval of new rules by management and men.

What does training cost?

Cost depends on too many variables for any estimate to stand up. Chances are, however, that safety training costs less than some officials think.

Here are some suggestions for keeping training costs down without diminishing the effectiveness of safety.

Capitalize on the experience of supervisors within the company. For informal, over-the-shoulder training on the job, they are better equipped than outsiders because they know local conditions and needs and are personally acquainted with local men.

Enlist the special skills of state and federal experts for formal classroom training, provided they are as skilled in the science of teaching as they are in safety principles and procedures. These public servants come to mining properties at little or no cost.

Seek out low-cost training aids. Safety films, booklets, posters, guides for classroom and conference discussion and textbooks are available at little or no cost from the U. S. Bureau of Mines, some state mining departments, the U. S. Departments of Commerce and Defense, manufacturing corporations (U. S. Steel, General Motors, du Pont and Esso Standard Oil, to mention only a few), life and casualty insurance companies, college and university extension departments and a few large coal companies. As for classroom demonstration materials, plenty of them can be found in almost any mine shop or supply room.

Schedule formal classes for off-shift hours or idle days. With companies and other interested groups and individuals taking right approach, showing workers how they benefit from safety training and what others are doing to make mining safe, miners and the union near Norton, Va., and elsewhere have agreed to make no demand for pay during training hours.

Keep an eye on safety costs. As one safety director points out, the amount of money spent on safety is not as important as the way it is spent. A safety program therefore should be kept continuously under review to determine whether the company is getting value received. That's the only sound way a company can decide whether to spend more money for safety or less, and where to increase or cut down on expenditures.

If the results are good—that is, primarily, a better safety record; secondarily, higher tons per man-day—additional expenditures may well be justified in the hope of still further improvement. If the results are not up to expectation, that need not be a signal to cut expenses but rather an indication that dollars need to be backed up with modern machines and equipment, better supervision and instruction, adaptation of the safety program to today's needs and more effective safety promotion.

Cost Cutting Today

This article, "Cutting Cost With Safety," is the eighth in *Coal Age's* continuing series on the coal industry's most crucial problem today—lower cost through higher efficiency. The series will continue in forthcoming issues of *Coal Age*.

Earlier articles in the series are as follows:

"Cutting Cost—What's Needed . . . How to Do It," January, 1953, p 70.

"Efficiency — Machine Made," May, 1953, p 86.

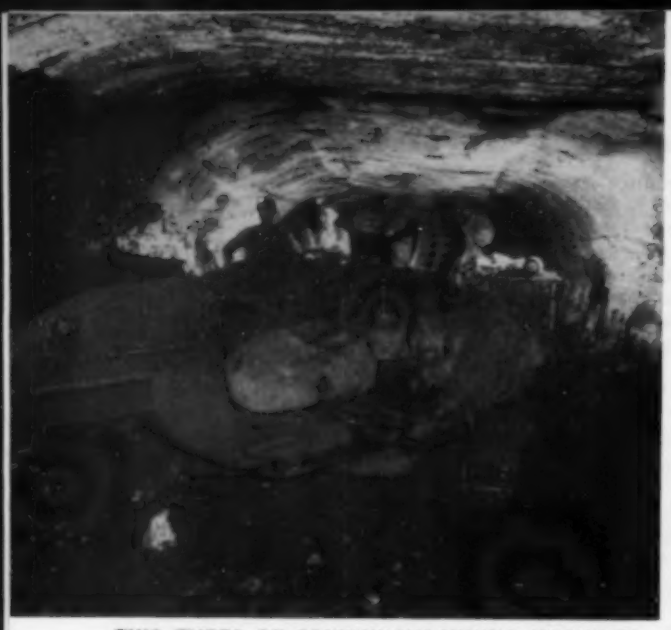
"How to Use Modern Materials and Equipment," July, 1953, p 66.

"Cutting Cost in Stripping," September, 1953, p 72.

"Cost Cutting at the Face," November, 1953, p 70.

"Cost Cutting Behind the Face," January, 1954, p 54.

"How to Produce Quality Coal at Low Cost," March, 1954, p 54.



TWO TYPES OF CONTINUOUS-MINING MACHINES produce all the coal (7,500 tpd) at Orient No. 3, where the goal is complete extraction. Spare machine in each section provides smooth operation.

Designing Orient No. 3 for Production-Line Mining

1. Power system geared to total continuous mining

2. Pillars completely extracted in Illinois No. 6 seam

3. Modern preparation serves today's markets

By HAROLD DAVIS

Associate Editor, COAL AGE

TOTAL CONTINUOUS MINING using two types of machines, and complete extraction of pillars in mining the No. 6 seam—not a common practice in Illinois—feature operations at the new Orient No. 3 mine, Waltonville, Ill., which is equipped, staffed and projected to develop the full productive potential of modern mining-engineering ideas. The new integrated operation, latest large-scale venture of the Chicago, Wilmington & Franklin Coal Co., also features (1) the longest highest-lift slope belt in the industry, (2) a modern wet-and-dry cleaning plant having a projected two-shift capacity of 14,000 tpd, clean coal, when the mine finally hits full stride and (3) a power-distribution system planned from the start to meet the demands of total continuous mining.

George B. Harrington, president and general manager of CW&F since 1915, led the company's efforts to bring in the mine at the highest-possible level of modernization. In all phases of planning, construction and operation Mr. Harrington marshalled the talents of his staff, including H. A. Treadwell, vice president—operations, and B. R. Gebhart, vice president—sales, both at the Chicago headquarters of the company, and F. Earle Snarr, general superintendent, who directs field operations of the company's three Orient properties from offices at Benton, Ill.

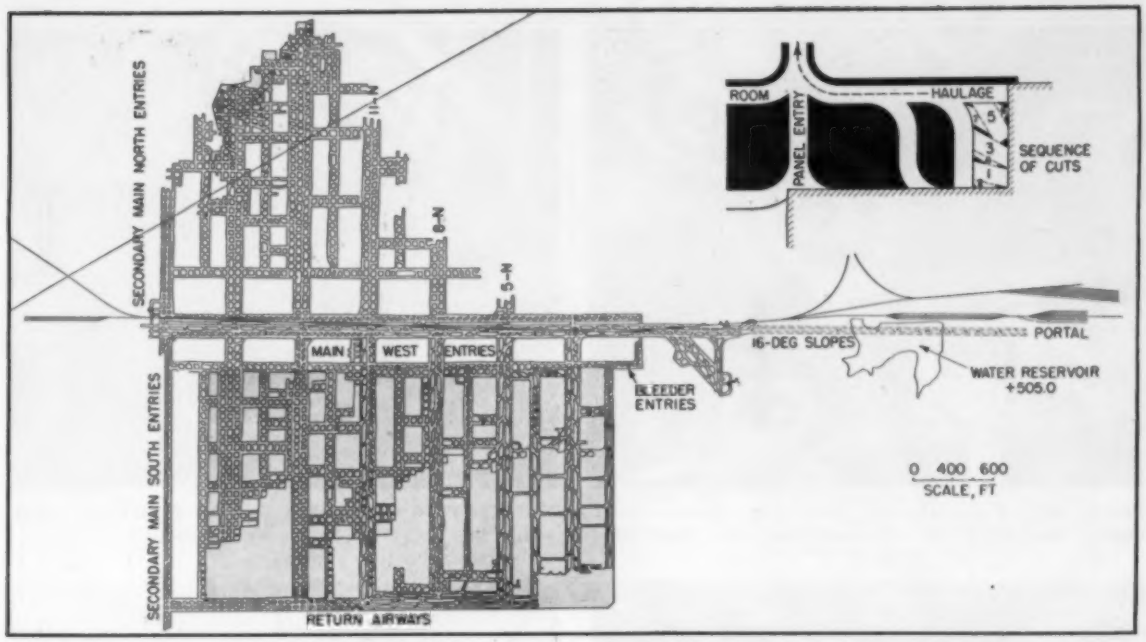
At Benton with Mr. Snarr is the core of the technical staff including: Ralph R. Richart, electrical engineer; T. L. Garwood, mechanical engineer; H. R. Stelzriede, manager of preparation, C. M. Walker, safety engineer; and Lloyd Saylor, mechanical supervisor. At the Orient No. 3 office, supervising the actual day-by-day operations, the man in charge is Fred A. Miller, mine superintendent, assisted underground by George A. Stachura, assistant superintendent, who closely supervises the development and pillar-recovery work which results in upwards of 85% recovery of the No. 6 seam. S. L. Hurst is mine manager.

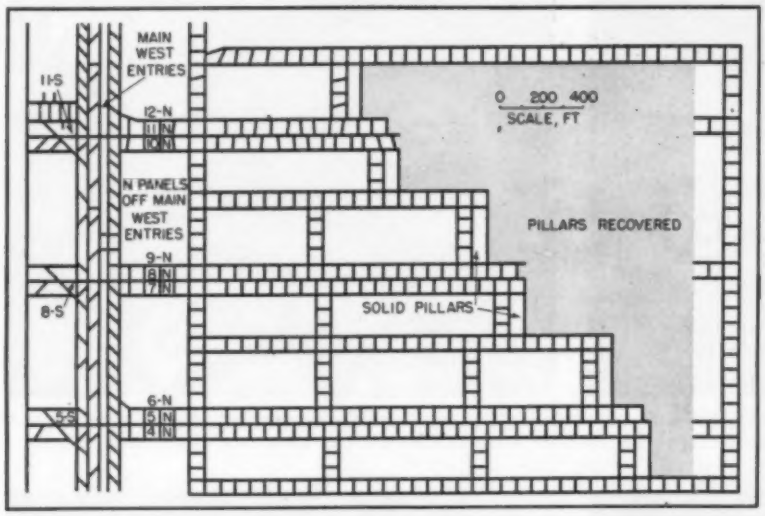
Fully recognizing that there are enough imponderables tending to reduce the calculated potential capacity of a mechanized mine, Mr. Harrington's team included in the design of Orient No. 3 all possible safeguards against interruptions having their origin in mechanical or electrical shortcomings.

For example, the design of the power-distribution system which carries the 4,160-v AC power on the property and into the mine is based upon the standards prescribed for 8-kv service. While this may appear at first glance to be an instance of overdesign, the fact remains that production at Orient No. 3 never has suffered as a result of power shortage. Furthermore, there is "elbow room" in the system to permit transmission at a higher voltage in the future if that becomes desirable.

As the story of operations at this modern mine unfolds, a number of other instances will turn up to show how CW&F officials took all possible steps to limit the effects of typical outages by making prior plans to handle them.

A well-planned block-and-panel system of mining contributes to high efficiency at the new mine. With a working force of about 350 surface and underground employees, daily





Working Plans for Total Continuous Mining

BLOCKS OF COAL (mine map above), approximately ½ sq mi in area, are worked out in toto. New mining areas are opened up by extending the main west entries or the secondary north and south entries. Positive ventilation is maintained against all gob lines to provide maximum safety. With panel development completed, including panel entries, returns and bleeders, full-retreat operations begin. Rooms are driven in pairs on 72-ft centers from both sides of the panel entries to the bleeders, as shown in the schematic diagram at the left. Solid pillars are left in place between pairs of rooms to maintain solid support behind pillar-recovery operations.

TRANSPORTATION EQUIPMENT includes shuttle cars, 36-in panel belts, a 48-in main belt and a 42-in slope belt.

THIS IS HOW the roof breaks after pillars have been removed. Cover here is about 800 ft thick.

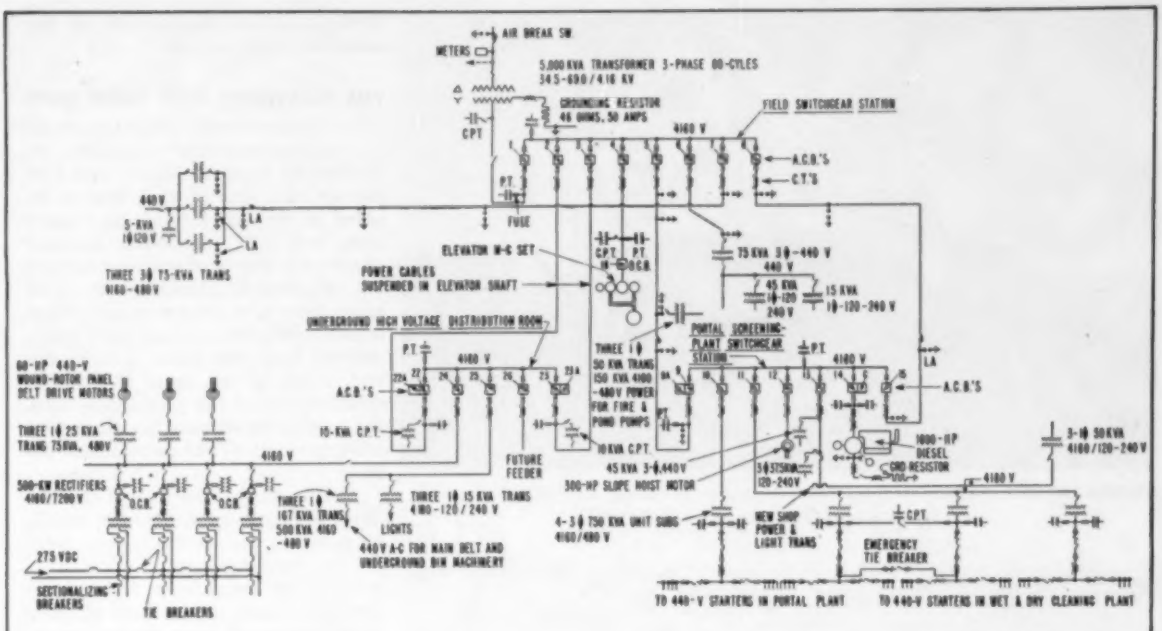
PANEL BELTS are driven by 440-v 60-hp AC wound-rotor motors. Main-entry belt is interlocked with panel belts.

DISTRIBUTING CONVEYOR receives discharge of main-entry belt and feeds 500-ton bin for slope-belt loading.

UNDERGROUND HIGH-VOLTAGE DISTRIBUTION CENTER (left), built into a concrete cell, and rectifier station (right), lined with sprayed mortar supported on steel mesh, are designed to meet rigid regulations.

SECTIONALIZING CIRCUIT BREAKERS and tie breakers assure maximum safety in DC power distribution.

NON-FLAMMABLE LIQUID-FILLED transformers serving panel-belt drives are installed in fireproof cells.



CIRCUIT-BREAKER ASSIGNMENTS (4,160 v):

1 Incoming line
2 Underground feeder to CB 22
3 Underground feeder to CB 23
4 Man-hoist elevator
5 Transmission line to prep. plants
6 Washhouse area light and power
7 Transmission line to upcast shaft
8 Bus feed from emergency supply
9A Remote control for field sw. station
9 Incoming line from field sw. station
10 Feeder to 750-kva subst. at portal plant
11 Feeder to three subst. in cleaning plant
12 Material slope hoist
13 Lights for cleaning plant and shop
14 Slope-belt motor (1,500 hp)
14G Slope-belt motor as AC generator
15 Emergency power to field sw. sta.
16 Starter for elevator m-g set
22A Compartment for control power transf.
22 Shaft-cable feeder from CB 2
23A Compartment for control power transf.
23 Shaft-cable feeder from CB 3
24 Feeder to 500-kw rectifiers
25 Feeder to 500-kva transf. sta.
26 Future mine feeder

LEGEND:

OCB—Oil circuit breaker
ACB—Air circuit breaker
LA—Lightning arrester
CT—Current transformer
PT—Potential transformer
CPT—Current-potential transf.

ADEQUATE, STEADY POWER for total continuous mining, maximum safety for the men in the mine and full protection for mechanical and electrical units are features of the up-to-date power system at CW&F's newest property.

production is running close to 7,500 tons, R-O-M.

HOW THE MINE IS LAID OUT

Main openings are twin slopes 2,850 ft long on a 16-deg dip down to the coal seam which lies under about 800 ft of cover. The job of driving these slopes, one accommodating a supply track and the other the slope belt, featured the successful application of McKinlay entry-driving machines which were modified to permit them to work at best advantage on the 16-deg dip. After early transportation problems were solved, these machines advanced the slopes at a rate of 15½ ft per day.

Interbedded hard strata were of course drilled and blasted and loaded out by conventional loading machines. However, the McKinlay machines mined 72.6% of the total length of the slopes.

Main west entries, as shown in the diagram of the underground workings, were driven in line with the slopes to a distance of 1 mi to an upcast air shaft as the first order of business. As this work progressed, 3-heading panel entries were turned south from the west mains on 680-ft centers and driven to a length of 2,600 ft. This 1x½-mi block thus became the first territory available for full-scale production. The return airways at the south limit of the block were driven east and west from the ends of the panel entries, and bleeder openings were driven midway between panel entries to permit positive ventilation against fracture lines during retreat operations. Main entries are protected by 300-ft-wide barriers.

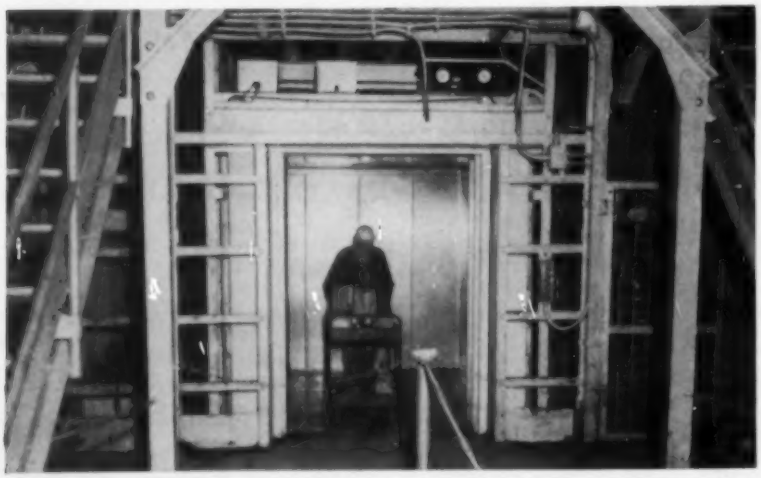
With panel development completed, including panel entries, returns and bleeders, full-retreat operations begin. Rooms are driven in pairs on 72-ft centers from both sides of the panel entries to the bleeders, as shown in the schematic panel-recovery diagram. Room pillars are immediately taken, then a new pair of rooms is driven, leaving a solid pillar between the new rooms and the gob in the worked-out area. The improved support resulting from this method of extraction makes for better roof breakage and consequently less pressure on the remaining pillars. There has been no sign of surface subsidence over the worked-out block.

Pertinent dates showing the rate of development at Orient No. 3 are Dec. 11, 1947, when the open cut for the slope portals was started, and March 15, 1951, when the first pillar coal was produced at the southeast corner of the worked-out block shown in the map of underground workings.

The block-and-panel system provides a large measure of flexibility in working the mine. When the active north block is completely worked out, the production equipment may be moved to the next square mile to the west or to the next square mile north or south of the worked-out blocks

PREPARATION FACILITIES include separate screening and cleaning plants and storage silos for raw and retail coal.

RETAIL-COAL SILOS are filled by this new radial stacker which carries a 30-in belt conveyor.



DOUBLE-DECK AUTOMATIC CAGE transports men and supplies in the 804-ft main shaft at Orient No. 3.

through further development of the secondary main entries.

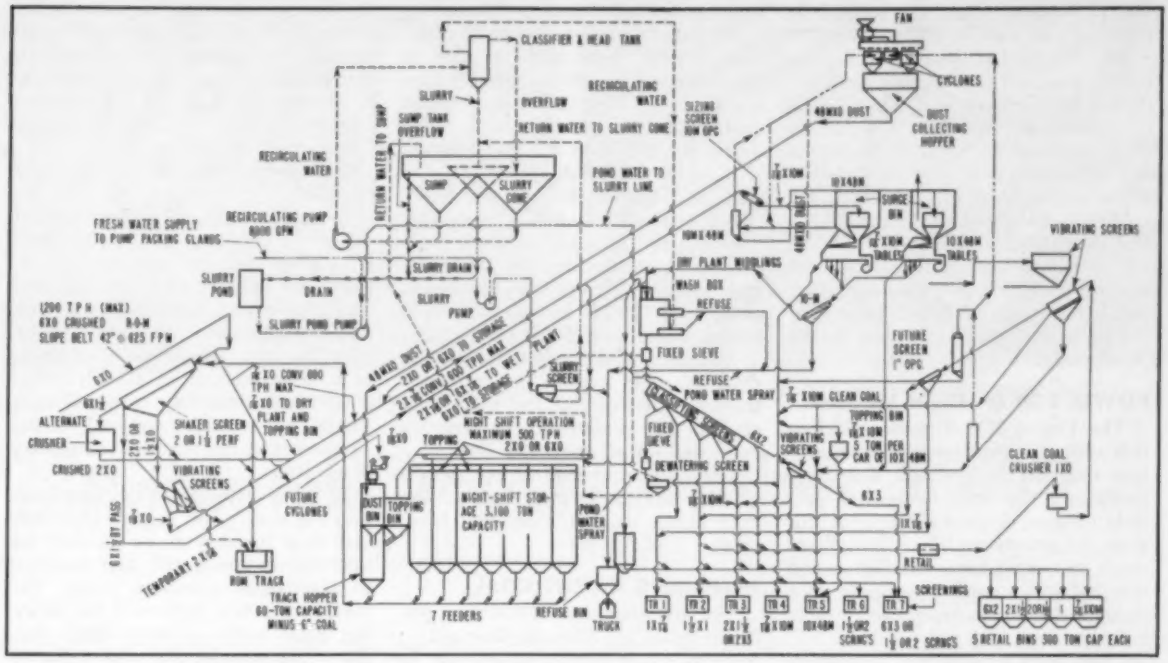
THE MACHINES AND THEIR USES

Production workhorses at Orient are 14 continuous-mining machines, including 10 Marietta Miners and four Joy 4JCM's. One of each type is located in the active block as a spare unit, and here is another example of how the effects of machine outages are minimized. Backing up these spare units is a section supply depot stocked with fast-moving spare parts, such as, hydraulic hoses, drive chains and so on. In the event of a breakdown of one of the production units, the section supervisor has three possible corrective alternatives, as follows:

1. He may be able to get the machine back into operation most rapidly by going to the section supply depot for the necessary part.
2. If the breakdown is so severe that it cannot be cleared in short order with parts from the supply depot, he may replace the out-of-service machine with the spare unit. The displaced machine then becomes the spare after it is repaired.
3. As a last resort, the supervisor may direct that the spare unit be cannibalized of the necessary part if he feels this can be done in less time than it will take to tram the spare to the active face and make the change, which at times may require towing the afflicted unit out of the way.

All development work is done by the Marietta machines which drive openings of constant dimensions, 7 ft high and 12 ft 10 in wide. The characteristic curved ribs of the Marietta-mined openings show little tendency to slough off. The No. 6 seam at Waltonville averages 9 ft thick, but approximately a foot of top coal and a foot of bottom coal are left in place both in development and in pillar extraction. Exceptions to this rule are made in the west mains where bottom coal is taken in the belt-conveyor and supply-track headings by a second pass of the Marietta machines, or by shearing the sides and loading out the bottom material with a conventional loading machine.

In pillar recovery, the Marietta machines extract room pillars while the Joy machines are used almost exclusively in bringing back the panel-entry pillars. The Mariettas at Orient No. 3 have been modified to permit greater maneuverability by making provisions to retract the cutting arms and to lower the top-cutting chain. These modifications, developed by CW&F officials, were specified in the



SINGLE-SHIFT OPERATION, at 1,000 tph, cleans the raw coal produced in two shifts at the mine. The 6x7/16-in raw coal is washed and 7/16-in x 48-M is dry-cleaned. Middlings from the air tables are passed through the washbox.

purchase of the latest machines, but all earlier machines have been similarly modified.

The mining machines load into Joy 10-SC shuttle cars, which in turn discharge onto 36-in panel belts installed in the center heading of each panel entry. Two shuttle cars serve each continuous-mining machine, and there are two Marietta miners and a Joy continuous miner in each panel. Panel belt conveyors are extended to within 250 ft of the intersection of the panel entry with the return airway. Thus, haulage distance seldom exceeds 350 ft.

Panel belts discharge to a 4,900-ft-long 48-in belt conveyor in the No. 3 main west entry which discharges to a distributing shuttle belt over the 500-ton surge bin at the foot of the main slope. Run-of-mine is fed from the surge bin to a rotary grizzly which scalps plus 6-in material and directs this oversize to a 30x48-in single-roll crusher where it is reduced to minus 6 in.

Both the crusher product and the minus 6-in material which passes through the grizzly are laid on the 42-in slope belt and transported at 625 fpm to the portal screening plant on the surface. This single-flight slope belt is 3,300 ft long with a lift of 868 ft. It is driven by a 1,500-hp General Electric synchronous motor through an eddy-current clutch. A full description of the heavy-duty drive appeared in Coal Age, January, 1954, beginning on p. 70.

Coal from entry-development operations is hauled to the surge bin at the bottom of the slope in 8-ton drop-bottom cars by 8-ton battery-powered Greensburg locomotives.

Panel crews include 18 men, counting the supervisor and the mechanic. The others are an operator and a helper on each of the three mining machines in the panel, an operator for each of the six shuttle cars, and four other men for making belt extensions, handling line curtains and so on. In development work, crews consist of 10 or 14 men, depending upon whether one or two continuous-mining machines are assigned to the section. Development crews include four haulage employees (two locomotives, five cars per trip) but lack the four service men included in production crews.

The mine produces two shifts per day with 105 men on the first shift and 90 men on the second. Maintenance and supply are third-shift duties handled by 60 men.

DESIGNS FOR SAFETY

Adequate ventilation, fire-prevention installations, planned roof bolting and diligent dust control provide the highest-possible degree of safety at Orient No. 3.

Ventilating air is carried through the mine in a single direction from intakes at the manshaft and through both slopes to the upcast air shaft at the west end of the present workings. All active faces and worked-out areas receive positive ventilation. As shown in the map, the fully-recovered and caved block, south of the west mains, is swept by air currents in the bleeders which parallel the west mains and the secondary south mains and in the return airways along the south limit of the block. The air from this section is led directly to the upcast air shaft.

The exhaust fan at the upcast shaft is a 7-ft Joy Axivane, operating at 1.8-in wg in providing 100,000 cfm. The fan is driven by a 150-hp motor, 440 v, AC, but plans call for a change to a 250-hp synchronous motor operating at 4,160 v. In addition to providing the necessary power for ventilating the growing mine, this change will release three single-phase, 75-kva transformers now at the fan for use in the new surface shop scheduled for early completion and also will provide an improvement in power factor for the entire system. This is another example of CW&F's constant planning toward higher efficiency and the more effective use of equipment.

Fire prevention steps have been taken by isolating the main-entry belt heading from the others through the use of fireproof stoppings in all breakthroughs except where panel belts are installed. Furthermore, a 2-in water

line is installed along the main belt with firehose taps at 500-ft intervals.

For safer roof support, the company relies upon 5-ft x ¾-in roof bolts installed by Fletcher roof drills in all long-standing openings, including panel entries, at wide intersections and wherever else they are needed in the judgment of mine management.

MSA Bantam rock-dusting machines and dust-allaying sprays on the mining machines are employed in dust suppression. The sprays on each unit are fed through a 500-ft hose connected to a branch water line in the panel entry.

POWER FOR MODERN MINING

The Orient No. 3 power-distribution system, as shown in the elementary diagram, is designed like other facilities at the mine to forestall possible failures. A good example of this is in the provisions which have been made to permit mine ventilation and manshaft operations to continue even though the purchased-power supply is interrupted. This independence will be had after near-future installation of a 1,600-hp diesel engine in standby service to operate the 1,500-hp slope-belt motor as a generator. Power from the generator then will be used to feed the bus at the field switchgear station, thus permitting operation of the fan and manshaft automatic cage.

Under these circumstances the field switchgear station may be controlled from the master control center at the portal screening plant to open the incoming line from the power company and to take off the line all power-consuming equipment except the fan and the cage.

Another safeguard for the continuity of production is in parallel operation of four 500-kw General Electric ignitron rectifiers which provide 275-v DC power for the face equipment. In effect, the four conversion units feed a common bus from which the power for each panel is taken.

Adequate feeder capacity is provided as further assurance that production will not lag as a result of insufficient power. Since the panel-entry faces when fully driven are a great distance from the conversion equipment, the DC lines in each panel include two 1,000-MCM positives and two 1,000-MCM negatives for the first 2,000 ft and single 1,000-MCM lines for the last 500 ft up to the distribution centers into which the face units are connected.

Conductor size also is carefully weighed, with due consideration being given to the conditions under which the power cables will operate. For example, in the 4,160-v AC lines (transmitting power from the field switchgear station through the underground distribution center to the conversion units) three different sizes of conductor are employed. Shaft cables are made of three 500-MCM phase conductors; the underground cable which is installed in a covered trench is made of 600-MCM phase conductors; and that portion of the cable which is supported on ⅜-in messenger wire on roof hangers is made with 350-MCM conductors. In the shaft and trench the extra copper reduces cable heat, which in these confined places would be difficult to dissipate.

As shown in the power-distribution diagram, the system is grounded through a resistor at the main substation, and lightning arresters are employed on all overhead lines.

For a description of Orient's effective support arrangement for its 7-ton shaft cables see the "Operating Idea" on p. 117 of this issue.

PREPARING ORIENT COAL

The preparation plant at Orient No. 3, designed by Allen & Garcia Co., includes a 7-ft Jeffrey Baum-type jig for cleaning 6 x ⅞-in coarse coal and six Roberts & Schaefer Super-Airflow cleaners for ⅞ x 48-M coal. The material to be dry cleaned is split at 10 M, the coarser size feeding four air tables and the 10 x 48-M fraction feeding two air tables Minus 48-M dust is removed by aspirating fans ahead of the cleaners, and middlings from the air tables are fed to the jig. Each of the cleaning circuits, wet and dry, handles about half the output of the mine.

Outstanding features of the plant include:

1. A separate portal screening plant where the discharge of the slope belt is received and the split at ⅞-in is made to provide feed for the wet and dry circuits. Handling these preliminary processes in a separate facility like this permits the elimination of a large amount of the structural steel which would be required in a single plant with raw-coal sizing equipment at the top of a full-gravity flow pattern.

2. Seven 450-ton storage silos built into the main plant receive nightshift coal from the mine to be released the next day via a collecting belt conveyor to the portal screening plant. The mine works two shifts and the cleaning plant works a single shift each day. The storage silos also serve to cushion the plant against fluctuations in feed from the mine.

3. Seven loading tracks, adequate blending-bin capacity and a mixing conveyor in the loading plant make it possible to meet exacting specifications over a great variety of sizes. Also available in the loading plant is a topping bin which holds a supply of ⅞-in x 10-M coal to be laid on top of cars loaded with 48 x 10-M coal to prevent windage losses.

4. Latest addition to the plant is five 300-ton retail-coal silos which are fed by a cantilever-type 30-in Barber-Greene belt conveyor, as shown in the illustration. The conveyor is pivoted at its feed end and supported on a circular-arc track to permit the discharge end to be spotted over any silo. Both the retail-coal silos and the second-shift storage silos at the main plant are equipped with lowering spirals to limit degradation during loading.

Present output is about 7,200 tpd, clean coal, oil-treated or not as desired. The plant working force includes a total of 33 men on two shifts —the operating shift and a service shift.

Two crushing sites are provided in the plant, one at the raw-coal end in the portal screening plant and the other at the clean-coal end in the loading plant. At the raw-coal end, the feed to the plant may be reduced to minus 2 in, and at the clean-coal end to minus 1 in, in either case increasing the stoker-coal yield. The flow circuits at Orient No. 3 are shown in the accompanying flowsheet.

One for the Road . . .

Instead of the familiar hail, "Neighbor, neighbor how art thee?" of horse and buggy days, it has become the custom on our highways to greet oncoming drivers with a cheery "Get over, you sap!"

Authorities differ on just what should constitute courtesy in motoring. However, a tentative list contains ideas crude enough to be practical, such as:

Never run over a pedestrian without excusing yourself.

Do not appear eager when crowding a smaller car off the road.

Upon hitting an immovable object come to a full stop.

Refrain from turning corners in the middle of a block.

Show proper respect for battered 5-ton trucks.

Don't argue with your wife while driving—you have a home for that purpose.

Application of these simple rules is bound to reduce the number of mass meetings on your highways.

Needless to say, standing back and allowing a train to use the crossing first is a bit of refinement in which virtue is its own reward.

—The Widen News

Scientific management by coal company points to . . . Double the normal mine-timber output as . . .

Research Boosts Timber Yield

By BEN RHODES, American Forest Products Industries
Washington 6, D. C.

THE EFFECTS of scientific forest management have been clearly demonstrated by the New River & Pocahontas Consolidated Coal Co. on a 30-acre experimental forest it maintains as a part of its 1,230-acre "tree farm," a third of which drapes the south wall of the New River Canyon in Fayette County, West Virginia.

The studies conducted there by the company have become widely known among industrial and farm-forest owners in the southern part of the Mountain State. Published data and frequent inspection tours and demonstrations held on the forest show that the company has increased the growth rate to more than double the West Virginia average sawtimber growth, computed at less than 90 board feet per acre by the U. S. Forest Service in a report published in 1952.

The annual timber growth rate on the company's research area has increased to 250 board feet per acre under intensive management, according to reports. Previously, the net growth was barely above zero because many trees were overmature. Decay and death among them was virtually offsetting new growth.

New River & Pocahontas Consolidated launched the research program in 1948, in cooperation with the Forestry Div. of Appalachian Hardwood Manufacturers, Inc. AHMI is an industrial association dedicated to encouraging forest management in the Appalachian region. Its forestry division is supported largely by coal-land owners.

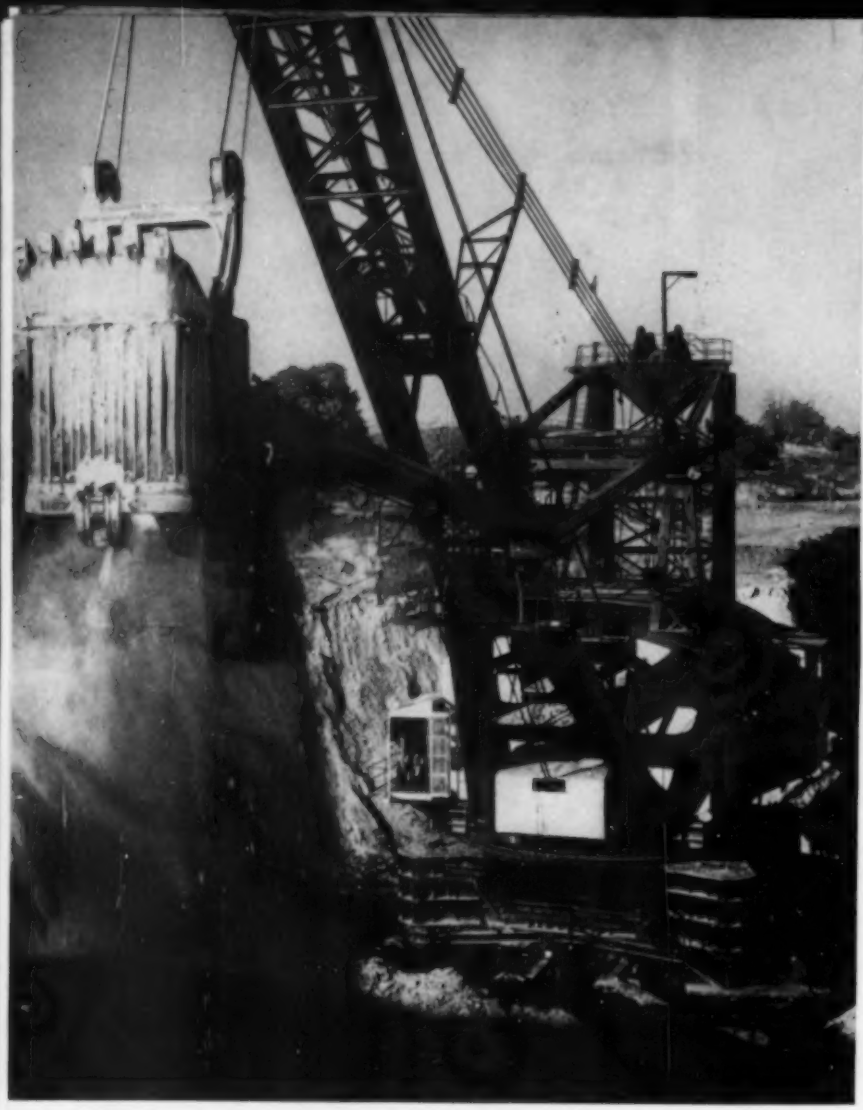
Experimental data compiled for 1948-53 are detailed in Forestry Memorandum No. 259, AHMI, 414 Walnut St., Cincinnati, Ohio. The research is under the direction of the coal company's forester, Ralph R. Kemper, and H. D. Bennett, AHMI forester, who prepared the memorandum.

When the company's tree farm studies began, only 20 acres of the experimental 30 supported timber of commercial size. Five acres were in grass and another five in young trees. Over-grazing had destroyed reproduction and the effect was park-like. Nature quickly corrected this after the company fenced the area. Five growing seasons later the seedling count was 7,000 to 8,000 per acre, the majority in preferred species such as red and white oak and tulip poplar, with some of the latter up to 12 ft high. The field, open 5 yr ago, now has over 4,000 seedlings per acre. In contrast, man can plant economically only about 1,000 to 1,200 seedlings an acre.

The research is sustained by the company and AHMI as a source of information on forest management for landowners who want to study the published statistics or inspect the results on the ground, as has been done from time to time by industrial landowners and farmers.

The coal company now is harvesting virgin hardwoods from the rugged New River Canyon, once thought virtually inaccessible. Its tree farm, dating from 1948, was one of the first certified in West Virginia under the Tree Farm program which recognizes tax-paying landowners who manage their forest land to produce continuing crops of trees. The program is sponsored nationally by American Forest Products Industries and in 36 states by private and government groups.

PART OF THE MINE TIMBER harvested at the 1,230-acre tree farm maintained by the New River & Pocahontas Consolidated Coal Co. near Fayette Station, W. Va. (right). The sawmill, 300 ft below the rim of the New River gorge, is located over the railroad track and only a few yards from the mine entry to save handling.



NEW HIGH-CAPACITY SHOVEL takes 36-yd bite and sets the pace for other large equipment at the Sunnyhill No. 8 mine.

HAULAGE is handled by 10 of these 32-ton units. New 1,200-ton bin permits faster dumping and smooths plant operation.

Sunnyhill

How New Equipment Has Helped Sunnyhill

1. New 1,200-ton storage bin provided surge capacity, permitting preparation plant to clean an average of 800 tph of coal. Maximum average under old setup was 703 tph. Now plant can prepare better than 1,000,000 tons of coal per year while operating on only one shift.

2. New 36-yd shovel eliminated four draglines formerly used to strip overburden.

3. New 7½-yd coal-loading shovel and concentrated work areas reduced coal-loading shovels from four on a 2-shift basis to two on a 2-shift basis. On the second shift one unit loads coal for storage bin.

4. Drilling and shooting was simplified by permitting work to be concentrated and done on day shift. Better digging ability of new shovel permitted increase in hole spacing and increased yardage per pound of explosive. One drill is assigned to each strip pit, resulting in a 20% increase in productive time since tramming time is eliminated.

5. Concentrated work areas permitted 20% reduction in shooting crews.

6. A significant saving was made in maintenance cost since there is less equipment and it is used only on one shift.

7. A 33⅓% reduction was made in the money tied up in parts inventory because of fewer units in operation and standardization of parts.

8. Pumping was simplified because of the fewer pits. Portable gasoline-driven units were replaced by semi-stationary electric units that need only a minimum of attention.

9. Supervision was made more effective because all pits can be visited in 45 to 60 min whereas up to 5 hr were required before new equipment was added.

10. Stripping capacity on a 7-day basis was increased by 500,000 cu yd.

11. More coal has been uncovered as reserve.

12. Premium pay differential was eliminated by operating only one shift.

Makes Its Money Do a Job

Why Sunnyhill Coal figured it worthwhile to spend $2,500,000 for larger strip equipment . . . How it went about financing the program . . . And what the results have been, in improved operation and better ability to maintain markets.

By A. E. FLOWERS
Associate Editor, COAL AGE

INVESTING $2,500,000 in new large-capacity strip-mining equipment has paid big dividends at the Sunnyhill No. 8 mine of the Sunnyhill Coal Co., New Lexington, Ohio. Tangible evidence of the benefits of the new equipment includes a 50% increase in the output per man-shift, a 58% reduction in truck operating costs, a 29% reduction in stripping costs, and a 71% reduction in drilling and blasting costs. Combined savings have permitted Sunnyhill to maintain its markets despite today's highly competitive conditions that have substantially reduced coal prices.

The foregoing savings are the major benefits derived from purchase of the following new equipment and facilities: a 36-yd Bucyrus-Erie 1050-B electric stripping shovel, a 7½-yd 150B coal-loading shovel, 10 Dart 52-ton semitrailer haulage units and installation of a 1,200-ton storage bin at the preparation plant.

Addition of the new high-capacity equipment marks the achievement of a goal that was planned when the No. 8 mine was opened in 1946. At that time, it was virtually impossible to obtain normal delivery of new large-capacity equipment that Sunnyhill's management felt was needed to mine the coal as economically as possible. Furthermore, Sunnyhill was a relatively new company with limited capital and, as a result, could not have purchased the expensive high-capacity units had they been available. To avoid delay in getting the mine developed and in production, management purchased smaller-capacity units, with the goal of replacing them in the future when larger units were available and company capital had increased.

To mine Sunnyhill's 1,000,000 tons of coal annually with the smaller units required six stripping units, four coal-loading shovels and 30 haulage units of various sizes ranging from 12- to 30-cu yd in capacity. Now stripping is done by three units working in three pits, coal loading is handled by two shovels and haulage by 10 trucks.

From previous experience, Sunnyhill management knew that competition in the coal industry would someday be much keener than in 1946. With the knowledge that Sunnyhill No. 8 was a good property with good physical conditions for economical mining, management's long-range plans called for setting up the mine to operate profitably when competition was keenest.

From 1946 to 1951, Sunnyhill operated successfully with the smaller equipment, but had not begun the program of equipment replacement to reach their goal of high-capacity units. A constant increase in labor costs and payments to the welfare fund and an industry-wide decrease in realization in that period retarded Sunnyhill from building up its equity in the operation to a satisfactory degree. As a result, management felt that it was time for long-range plans to be put into operation to reduce costs.

To purchase equipment needed to replace the smaller units and to provide a 1,200-ton storage bin at the preparation plant would require investment of about $2,500,000. Sunnyhill, like most other companies, did not have that amount of cash on hand, so purchase of the equipment would have to be financed through a bank. Management was confident the investment in new equipment would pay for itself and began to assemble information which would be presented to officials of the Mellon National Bank & Trust Co., Pittsburgh, for consideration as the basis for a loan. In the proposal, Sunnyhill detailed the savings to be achieved with the new equipment. The bank was convinced of the soundness of

What Goes into a Loan Proposal?
Sunnyhill's 11 Steps in Borrowing $2,500,000

1. Set forth the pertinent facts relative to operating conditions and coal reserves at Sunnyhill No. 8 mine.

2. Summarized what equipment would be purchased, how it would be used, what benefits would be derived from purchase of the equipment and how the equipment would be financed. A detailed capital-recovery and cost analysis for the 5-yr period detailed how the investment would be recovered and the savings achieved.

3. Pointed out how the modernization program would enable the company to reduce operating costs as a hedge against possible declines in coal prices in the foreseeable future. Emphasized how the addition of new equipment would place the company in an advantageous cost position, which, in addition to a favorable geographic location, should insure a profitable operation. To provide a basis of comparison as justification for the modernization program, a detailed cost sheet of past, present and estimated stripping costs was included.

4. Detailed the company's cash position with new equipment over the 5-yr period with reduction in indebtedness.

5. Estimated haulage and stripping costs. These costs were based on a roundtrip of 7 mi and 11.8:1 stripping ratio, which were actual values over a period of 1½ yr. For purposes of comparison, included estimates by various truck manufacturers.

6. Set up a pro forma balance sheet for the period 1952 to 1957. This was a detailed analysis of assets and liabilities for each of the years, reflecting the effect of the new equipment.

7. Made a pro forma statement of earnings to be achieved over the 5-yr period with the new equipment.

8. Made an analysis of working capital for the 5-yr period.

9. Outlined a 5-yr. schedule of debt reduction.

10. Listed any additional capital expenditures other than the new equipment that were anticipated for the 5-yr period.

11. Made an analysis of the proposed sale of capital assets to be replaced by the new equipment.

MODERN PREPARATION PLANT is geared to handle 900-tph of raw coal. Features include jig washing, centrifugal drying, crushing and automatic water neutralization.

WELL-COORDINATED OPERATION results from teaming this 7½-yd loading shovel and 52-ton trucks with 36-yd shovel. Dragline (right) also plays important role. With 175-ft boom and 13-yd bucket it handles spoil from top of bank.

MAINTENANCE CENTER is housed in this large all-metal building. All repairs but machine shopwork is handled here.

RADIO COMMUNICATION permits P. L. Snyder, general manager, to coordinate operations with minimum travel.

TRUCK-MOUNTED DRILLS include both horizontal and vertical types. Two crews serve the three active pits.

RECLAIMING THE LAND is continuous job for bulldozers. Trees grow better on spoil than on undisturbed land.

THIRD STRIPPING UNIT is this 18-yd electric shovel which recently was completely rebuilt. Pit originally was worked about 30 yr ago.

the proposal and on March 16, 1951, Sunnyhill entered into a loan agreement with the Mellon National Bank & Trust Co. The company was then indebted to the bank and the new agreement provided that the bank would lend an initial $1,000,000 and further provided that it would lend an additional $800,000 not later than April 30, 1953, to be advanced to Sunnyhill upon delivery of the 1050B shovel. Repayment of the loans was agreed on at the rate of $0.40 per ton of coal mined, and with minimum annual payments in a stated amount.

A revised loan proposal to make possible the purchase of 10 new high-capacity haulage units and construction of a 1,200-ton storage bin was submitted to the bank on Aug. 4, 1952. Sunnyhill showed in this proposal that truck-haulage costs could be reduced by about 40%—a gross saving of approximately $195,000 per year and that a new bin would eliminate the need for trucks to back to the edge of the bin, hoist the truck bed and then lower it. As a result, delays caused by choked crushers, blinded screens or lack of coal would be eliminated in the preparation plant. The resulting total increase in cash recovery at the end of 5 yr when the loan would be repaid was estimated to be $980,000 on an investment of slightly over $500,000.

Accuracy of the original estimates of mining costs to be achieved with new equipment was confirmed by the remarkably close agreement between estimated and actual costs after the equipment went to work. For example, in the month of November, 1953, actual mining costs and estimated costs made in 1952 agreed within 0.2c per ton.

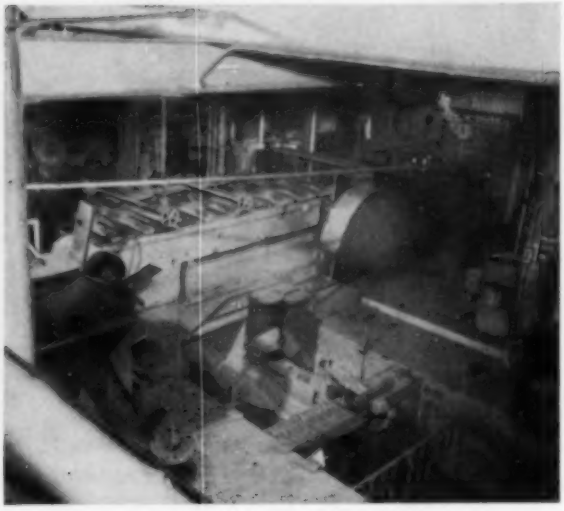
Cost reduction in 1954 should be even better than estimated because the last hired trucks and small-capacity stripping unit were retired from service in December, 1953. This small equipment had been used to recover an isolated tract of coal that Sunnyhill had not wanted to abandon. Management was willing to absorb the increased costs to recover the coal there.

MINING METHODS

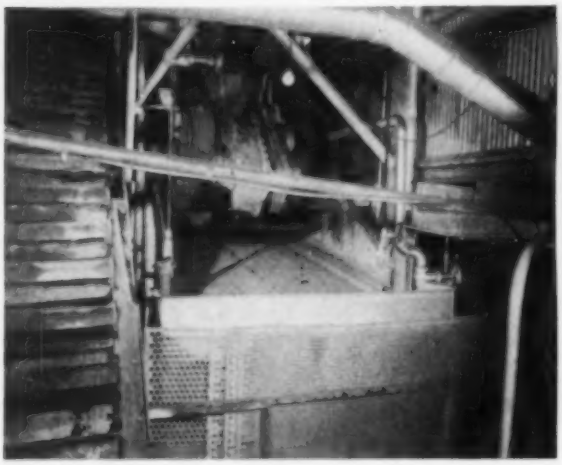
Sunnyhill No. 8 mine is located at the western extremity of the eastern coal measures near New Lexington, Ohio. Some parts of the property were covered by a glacier and therefore extensive drilling was required to determine the limits of mining. Before Sunnyhill was opened, data were assembled from about 2,000 drillholes to determine the nature of overburden, how much coal was present and where it was located. All available information was plotted on outcrop maps and 10-, 30- and 50-ft cover lines were drawn in. Reserves and stripping ratios were calculated for each of the cover lines.

Mining is primarily in the Ohio No. 6 seam which averages 50 in in thickness. However, 12 to 14 in of high-ash and low-Btu bony coal and a 1- to 2-in rock parting at the top of the seam is discarded in the pit before the coal is sent to the cleaning plant. The remainder of the seam consists of two 16-in benches of coal separated by 1- to 2-in rock parting. The underlying No. 5 seam also is recovered where boreholes have proven it to be present in sufficient thickness to warrant mining. When found in minable quantities, the No. 5 coal averages about 30 in in thickness. Interval between the two beds ranges between 23 and 31 ft.

RAW COAL is delivered to the cleaning plant by a pair of 48-in belts. Each may be operated independently if desired.

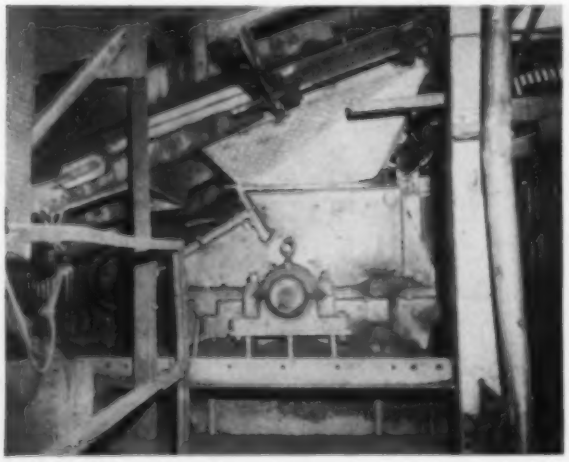


JIG WASHING is at 1.45 sp gr in 5-cell unit. Separation is easy and both coals wash well together.

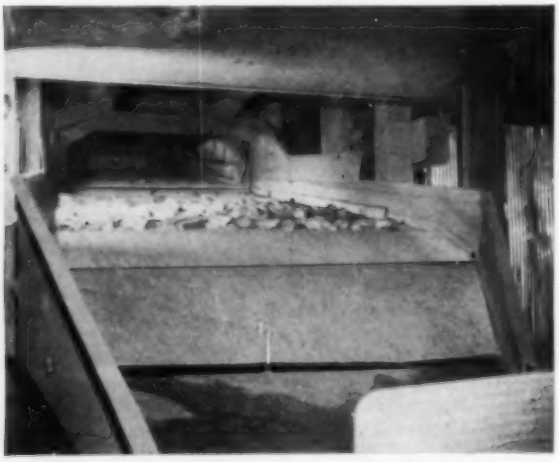


FINE-COAL SIZING and dewatering is handled by vibrator units. Minus 28M sludge is delivered to settling pond.

TWO-COMPARTMENT 54-in domestic conveyor distributes coal to four railroad tracks and four domestic bins.



BIG CRUSHER is available to reduce larger sizes of washed coal down to 1½x0.



CLASSIFYING SCREEN makes initial separation after clean coal leaves the washing unit.

With the new equipment, the No. 6 seam is mined to a 60-ft highwall, although this is not a fixed limit and may be varied up or down, depending on the nature of the overlying material and whether there is any minable No. 5 coal present. A typical section of the highwall, beginning at the top of the No. 6 coal, consists of 20 to 30 ft of shale, 20 ft of soft, massive sandstone and 10 ft of dirt and shaly material. The rock strata between the No. 5 and No. 6 coals usually consists of 4 to 8 ft of hard shale immediately over the No. 5 coal, 4 ft of sandstone, 10 ft of carbonaceous shale and 5 to 9 ft of fireclay underlying the No. 6 coal.

PREPARING THE OVERBURDEN

Blasthole drilling is done on a 2-shift basis by two 2-man drill crews. These men use both horizontal and vertical 6-in McCarthy truck-mounted units to drill holes in the three active pits. About 90% of all drilling is horizontal. Horizontal holes are drilled in the shallower and softer overburden while vertical holes are required only when the rock is thick and tough. Spacing for both horizontal and vertical holes is governed by the type of stripping unit in the pit and the nature of the overburden. Thus horizontal holes may range from 40 to 70 ft in depth and holes may be spaced on 15- to 30-ft centers. Vertical holes vary from 30 to 50 ft in depth, and sufficient holes are drilled on 15- to 21-ft centers to give the necessary pit widths for the different stripping units.

Since the new high-capacity units have gone to work, all blasting is done on the day shift by a 4-man crew. Blasting is done with Airmite and no more than 15 holes are fired at one time. This type of explosive is most effective when used in dry holes and must be detonated as quickly as possible after loading for the best results.

UNCOVERING THE COAL

Overburden removal in the three active pits is handled by the new 36-yd 1050B electric shovel, a 13-yd Marion 7400 dragline and a 18-yd Bucyrus-Erie 750B electric shovel. The 36-yd unit operates three shifts per day, 7 days per week and the other two units work three shifts on a 5-day basis. With this setup, the three move an average of 1,550,000 cu yd of material per month. Before the new shovel went into operation, stripping was done three shifts per day, 7 days per week and the yardage moved by six stripping units was 1,250,000 cu yd. Each of the present stripping shovels is operated by a 3-man crew and the dragline is operated by a 2-man crew.

The 36-yd unit has played the key role in overburden removal ever since it went into operation in July, 1953. It normally operates on top of the coal in a pit 85 ft wide and works to a 50- to 60-ft bank. The 29% reduction in stripping cost is credited to this new unit.

The 18-yd shovel also works on top of the coal and also works to a 50-ft highwall. While this unit is 25 yr old, it was completely rebuilt in the summer of 1953. Thus all stripping units are practically new machines.

Each of the shovels removes overburden down to the top of the coal seam, leaving the bony coal and the underlying parting for later removal by bulldozers and a motor grader.

The 13-yd dragline has a 175-ft boom and works on top of the highwall while uncovering coal in a pit 65 ft wide. This unit removes as much of the bony coal as possible and the remainder is handled by bulldozers and the motor grader.

LOADING AND HAULING

Cleaning of the coal before loading is done by a motor grader and, in addition, a man is assigned to each pit to remove by hand any impurities missed by the grader. Both the No. 5 and No. 6 coals are soft enough to permit loading without shooting.

Coal is loaded in two of the three pits by either a Bucyrus-Erie 150B 7½-yd electric shovel or a Bucyrus-Erie 54B 4½-yd electric shovel. One shovel works two shifts, and second-shift coal loading activity is limited to one pit where coal is loaded for delivery to the 1,200-ton storage bin for cleaning the next day.

Under the old equipment setup, there were four coal-loading shovels operating full time on two shifts. In July, 1953, the new 150B unit went into service and, in March, 1954, the 54B was purchased. As a result, two 3½-yd, one 3¼-yd and one 2-yd units were retired from service.

The 7½-yd 150B shovel loads the coal uncovered by the 36-yd stripping shovel while the 4½-yd 54B handles the coal uncovered by the other two.

As noted previously, the 58% reduction in haulage costs resulted from installation of the 10 new Dart haulage trucks. These semitrailer bottom-dump trucks are powered by 300-hp Cummins NHRBS 500 diesel engines and are equipped with Allison TC-654 torque converters and TC-602 Torqmatic transmissions. The tractor units are equipped with 14.00x24 20-ply tires in the front and 18.00x25 28-ply on the rear. Trailer units are equipped with 18.00x25 28-ply tires and BendixWestinghous airbrakes. All tires are rock-service type.

Steering is made easy by Vickers hydraulic-power boosting units. All units are equipped with governors that limit top speed to 32 mph.

To eliminate all batteries except standard 6-v units for headlights, the trucks have been equipped with Ingersoll-Rand 9-BM air starters operated by air supplied at 100 psi from a storage tank on the tractor. Trucks have stood idle 4 or 5 days and the air-storage tanks have retained enough air to start the engines. All trucks are parked at the shop on idle shifts and a compressor line with suitable outlets is installed around the shop to permit easy refilling of air tanks at the start of the work shift.

Main haulage roads are constructed with wide road beds and have good alignment so that the 52-ton trucks can travel at top speed. When the semitrailer units were added, only minor changes such as widening some curves and clearing areas to improve driver vision were needed. When fills are necessary to get the proper grade, they are made with any available nearby material. This is leveled and compacted by bulldozers and covered with a 3-ft layer of hard shale which also is leveled and compacted by bulldozers. Trucks operate on top of this until it has become stabilized and management is satisfied with its condition. Then several layers of crushed limestone are added. The first is No. 3 size stone and is applied 3 to 4 in thick and compacted by the trucks. Later, No. 6 stone is added to make a total thickness of 6 in.

Empty trucks travel to the loading area on roads that are cut in the outside of the spoil banks and enter the coal pit through a window cut through the spoil. Since only empty trucks travel on these roads, they are not built up with rock and crushed stone. Periodic scraping with a motor grader is the only maintenance needed. Loaded trucks travel on top of the coal while leaving the pit and then take the shortest route to the improved permanent haulage road.

Haulage units carry the coal a distance of between 3 and 4 mi to the 1,200-ton bin. The bin was built with a 3-lane runway that permits trucks to unload on either side. This feature permits trucks to unload without stopping and distribute coal evenly. It also assures fullest utilization of bin capacity when coal is stored there on the second shift.

In addition to speeding unloading of trucks, the new storage capacity

AUTOMATIC CONTROLS (left) measure pH of plant water and operate vibrator (right) feeding lime to raw water.

permits an even, continuous feed to the preparation plant and is the main reason the plant can clean 800 tph. The bin also permits the trucks to continue operating when there is a preparation-plant failure.

RADIO AIDS COMMUNICATION

Communication between pit, maintenance crews, preparation plant and supervisors is speeded by two-way radio. Units are installed in the preparation plant, all stripping units, maintenance truck and all supervisors' cars. Benefits of radio are better supervision since less time is spent traveling to check on each unit; less down time for equipment because in the event of a failure a new part and maintenance crew can be on the way in a matter of minutes; and less wear and tear on supervisors' transportation units since less time is spent traveling.

RECLAIMING THE LAND

Land reclamation is a continual, planned operation at Sunnyhill. Each year, 350,000 locust and hardwood trees are planted on leveled spoil banks. Seedlings are purchased at $8 per thousand and 1,000 are set out per acre. Bulldozers cut down the spoil banks to conform with the gently rolling topography of the original land. Where the natural terrain is favorable, dams have been built to create artificial lakes that furnish water for the cleaning plant and will provide future fishing and recreation areas for the surrounding communities. It costs Sunnyhill an average of $178 per acre to reclaim the land. For each ton of coal mined, Sunnyhill sets aside 5c for reclamation work. This investment will pay off in the not too distant future when trees can be harvested and sold at a profit.

CLEANING THE COAL

Two 450-tph 5x19-ft shaking-pan feeders deliver coal from the 1,200-ton bin to a series of two 48-in belt conveyors, the second of which discharges onto a screen that separates coal into plus 5 in lump and 5x0. One feeder is equipped with a Reeves variable-speed drive.

The 5x0 underproduct passes to a 48-in apron conveyor that delivers it to a 48-in belt conveyor where one man handpicks it before it flows to a 2-in bar screen that separates it into plus 2 in and 2x0 products. The coarse product is broken to 2x0 by a McLanahan & Stone 24x48 crusher, joins the 2x0 product from the bar screen and is delivered to the No. 1 raw-coal scraper conveyor. The No. 1 raw-coal unit discharges onto the No. 2 raw-coal conveyor which delivers raw coal to a 5-cell McNally Norton jig.

The plus 5-in overproduct from the primary raw-coal separation passes to a battery of two 5-in bar screens and is separated into plus and minus 5-in fractions. Underproducts pass directly to the No. 1 raw-coal conveyor for delivery to the wash box and the plus 5 in flows to a pair of 48-in-belt picking tables. Handpicked refuse is directed to a refuse bin for later removal to a spoil area by truck. Plus 5-in lump flows to the clean-coal screen and is delivered to railroad cars by a loading boom.

Raw 5x0 is separated into refuse, middlings and clean coal in the wash box. Refuse passes to a series of two refuse conveyors and is delivered to the refuse bin.

Middlings from the jig are either passed directly to refuse or delivered to a 1-in middlings bar screen where it is sized into plus and minus 1-in fractions. The 1x0 flows to a middlings scraper conveyor and joins the washer refuse. The 1x5 product is delivered to an 18x24 crusher and then to the No. 1 raw-coal scraper conveyor for wash-box recirculation.

Clean 5x0 is delivered to the washed-coal screen and is separated into 2x5 egg, 1¼x2 nut, 1¼x¼ stoker and ¼x0.

The 2x5 egg and 2x1¼ nut may be delivered directly to railroad cars or to the two-compartment domestic scraper conveyor which carries coal to a battery of four domestic bins. A 24x48 Jeffrey Flextooth crusher installed at the end of the lump boom permits crushing lump coal to 1½x0. The 1¼x¼ stoker coal flows to either the washed-stoker bin, domestic pea bin or to a series of scraper conveyors for further dewatering and sizing on a double-deck 6x16-ft Allis-Chalmers Low-Head vibrator equipped with ⅞-in-square and ½x⅛-in slotted screens. Oversize from the vibrator is directed either to the 1¼x¼ washed-stoker bin over the railroad track or to the domestic conveyor and discharged in the domestic pea bin.

The ¼x0 is sent to a pump sump where a 6-in Barrett Haentjens pump picks it up and delivers it to a 6x16-ft Allis-Chalmers double-deck Low-Head dewatering vibrator equipped with 8M and ¼-mm screens.

Minus 28M flows to a sludge sump and is delivered via a 10-in wood pipe, 2,500 ft long, to a sludge pond by a 6-in Barrett Haentjens sludge pump. The ¼x28M passes to two Reineveld centrifugal driers for further dewatering and is delivered to an 8x24 scraper conveyor that discharges to the two-compartment domestic scraper conveyor. It then passes to the domestic pea bin.

Overflow from the drag recovery

tank passes to a sump where two 5-in Barrett Haentjens pumps pick it up and deliver it to a battery of four 16-in Prins cones. Each of the cones handles 400 gpm of feed. Concentrated solids pass to a 4x10-ft Allis-Chalmers Aerovibe screen equipped with ¼-mm wedge-slot screen. Plus ¼-mm solids join the wash box refuse and are delivered to the refuse bin. The minus ¼-mm underflow passes to the sludge sump and is pumped to the sludge pond. Cone overflow is delivered to the recirculating pump sump at the discharge end of the recovery tank.

AUTOMATIC pH CONTROL

Further evidence of the application of new methods and equipment to reduce costs is a fully automatic electrically controlled water neutralizing system that controls acidity and continuously records pH values. Lime is fed to raw water by a Syntron feeder beneath a bin. Controls for the system are Leeds & Northrup Micromax systems. Benefits of the neutralization system are greatly increased life for all metal coming in contact with water and elimination of hand-liming methods, formerly required 24 hr per day, 7 days per week.

Plant water is obtained primarily from surface runoff and is conserved for re-use as much as possible. In the first dry season after the plant was installed, water acidity increased until pH was 2.5 and corrosion became a problem throughout. To combat acidity and ensuing corrosion, Sunnyhill used a double-barrel attack. Stainless-steel plates, screens and fittings were installed and liming of water by hand proportioning was introduced. Benefits include better performance of plant equipment, large savings in maintenance labor and less down time (*Coal Age*, March, 1952, p 92). To insure uniform treatment and reduce cost the automatic control system was installed.

Equipment included in the automatic system consists of a glass-electrode assembly, a Micromax electric control and a drive mechanism which operates a lime feeder. The electrode unit assembly consists of a measuring electrode, reference electrode and a temperature compensator. All are continuously suspended in the mixing tank and develop a potential proportionate to pH.

Wires lead from the electrode assembly to the Micromax pH controller which has a continuous pH recording chart. As the pH of the plant water varies, the change in voltage generated by the electrodes is measured by the controller. At Sunnyhill, the pH usually drops as acid water is added and the controller sets in operation the control unit which increases lime flow. The increase in lime flow is proportional to the amount of variation in pH from the desired 5.8 value and the length of deviation, Flow of lime is regulated by a sliding gate at the bottom of the lime bin discharging to a Syntron vibrator that delivers lime to the reaction tank.

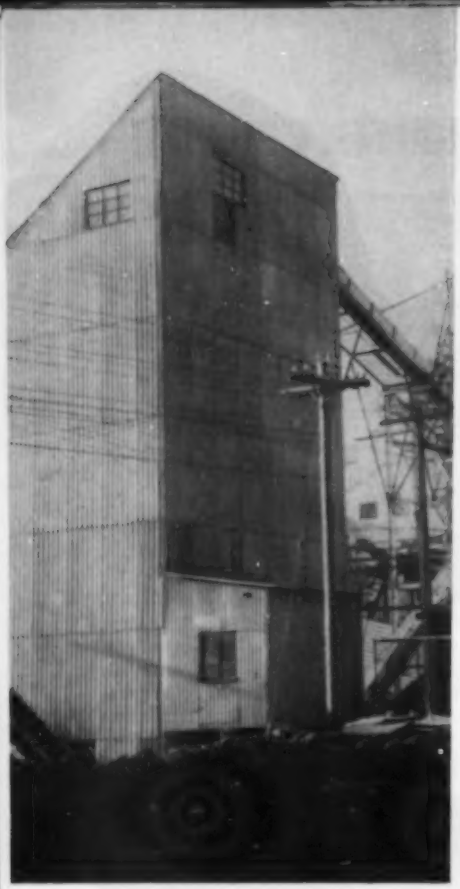
The only human effort the system requires is refilling the 5-ton lime-storage bin. One man breaks 50-lb bags into a hopper that discharges into a bucket elevating conveyor emptying into the top of the bin.

Conditioned water is discharged to a 5,000-gal tank and pumped to the washer by a 14-in 2,000-gpm Byron Jackson Co. vertical turbine pump powered by a 50-hp motor.

Visitors View Sunnyhill No. 8 in Action

BANKERS AND COAL MEN gather around the 36-yd shovel after inspecting the Sunnyhill mine. Included in the group are: A. G. Keller (left), vice president, Mellon National Bank & Trust Co.; Jonathan Raymond, vice president, Mellon National Bank & Trust Co.; Cole Ward, Brown-Ward Co., coal brokers, Detroit; Charles Veatch, vice president, Mellon National Bank & Trust Co.; James Watts, Buick Motors, Detroit; H. G. Ward, Brown-Ward Co.; C. H. Snyder, president, and Arnold Lamm, executive vice president Sunnyhill Coal Co.

CANADIAN VISITORS from Valley Camp Coal Co. of Canada, Ltd. Standing: D. H. Swanson (left), president, Snyder & Swanson, Inc.; A. J. Smith, manager, Tillsonburg; H. H. Stewartson, sales manager, Snyder & Swanson; Mack K. Burdg, district manager, Welland; Malcolm Dunderdale, sales representative, Hamilton; K. D. Mooney, vice president, and managing director, W. R. Crawford, sales representative, Toronto; A. E. Lamm, executive vice president, Sunnyhill Coal Co.; J. H. Plump, superintendent, Sunnyhill No. 8; Seated: R. D. Banks (left), salesman, Snyder & Swanson, Inc.; F. W. Cooper, district manager, Ridgeton; Watson Murray, district manager, North Bay; H. E. Reeb, executive assistant, sales; and S. Bush, general sales manager.



TALL AND SMALL—new 7-floor fine-coal plant for West Canadian Collieries is 28 ft long, 16 ft wide and 52 ft high. It handles 70 tph of 7/16x0.

Laundering Fine Coal

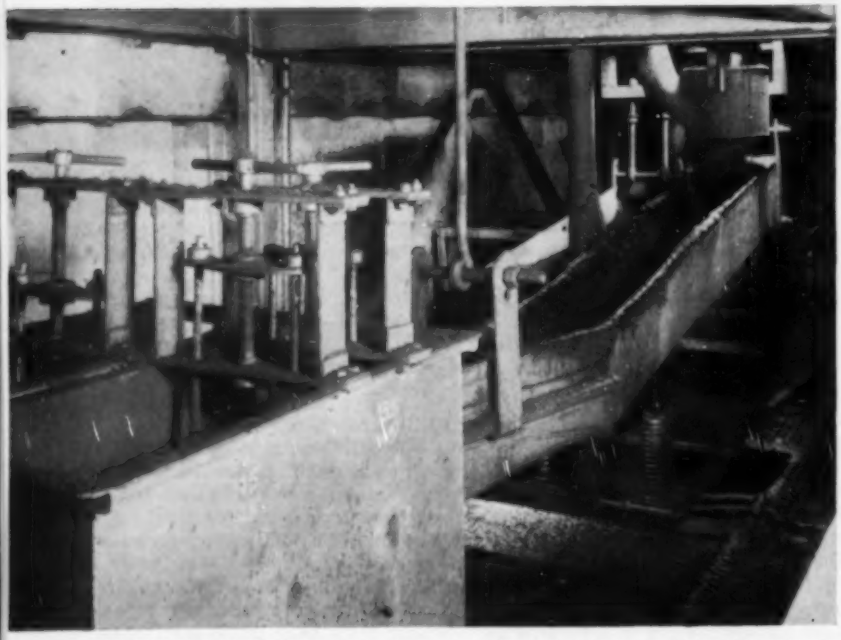
High efficiency marks use of new unit with vertical rather than horizontal discharge by West Canadian Collieries, Ltd.

By L. DUPRET, Chief Engineer
West Canadian Collieries, Ltd., Blairmore, Alta., Canada

FIRST on the North American continent, a new launder-type washer installed by the West Canadian Collieries, Ltd., to increase its output of washed 7/16x0 coal is performing with a probable error of 0.07 and an efficiency of 96.2%, making it one of the most-efficient units for fine-coal cleaning available today.

Simplicity in layout, promising a reasonable price for the equipment with low operating and maintenance costs, were other advantages which appealed to West Canadian Collieries representatives in their investigation of the process and discussion with European users and engineers representing the manufacturers at the International Congress for Coal Preparation held in Paris in 1950. It therefore was decided to adopt this Lamex process when it became necessary to expand the output of washed 7/16x0.

Construction of the Lamex plant was started in June, 1953, and it went into operation 2 mo later. It was built to handle 70 tph of 7/16x0.



SIX TWIN LAUNDERS—one shown here from discharge end—handle primary separation and retreatment of 7/16x0.

PROCESS DEVELOPMENT

The use of a flowing current as a simple and convenient means of separating materials of different specific gravities has been known for centuries, as illustrated by the picture of the gold miner hopefully watching his sluice boxes. Although the problem of separating materials of closer specific gravity, such as, coal and shale, is more difficult than separating gold from sand, launders were already in use for coal beneficiation in Europe more than 100 yr ago.

One of the main difficulties was providing a means of continuously removing the heavy material without disturbing the stratification and drawing some of the coal along with the refuse. At the turn of the century, a Belgian engineer, Antoine France, solved this question quite successfully and originated the Rheolaveur process.

A drawback of the standard laun-

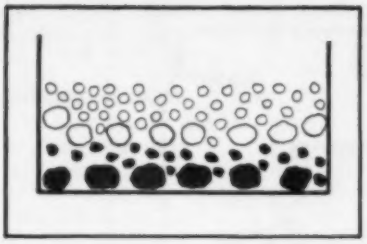


FIG. 1—PRODUCT CLASSIFICATION with hindered settling processes.

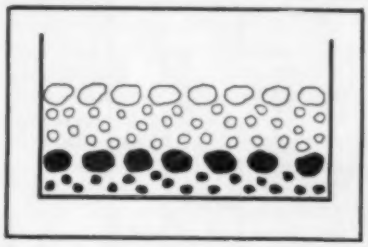


FIG. 2—PRODUCT CLASSIFICATION provided by new launder units.

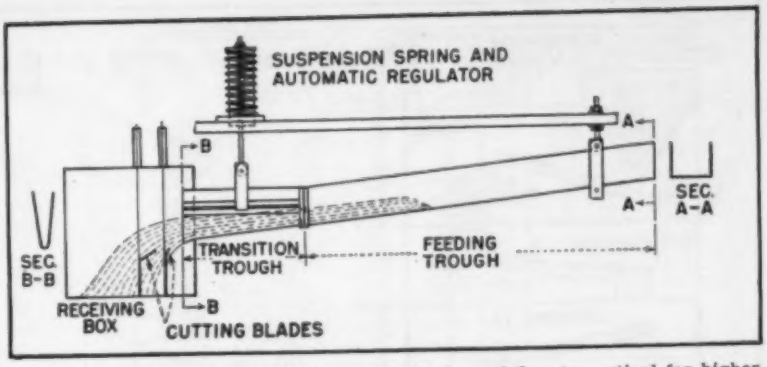
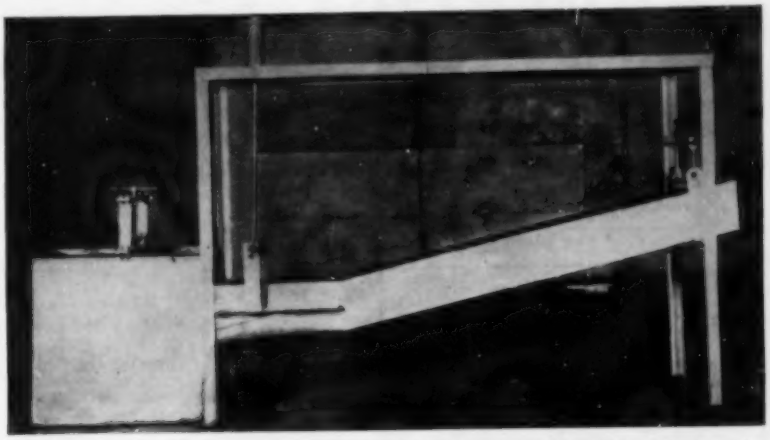
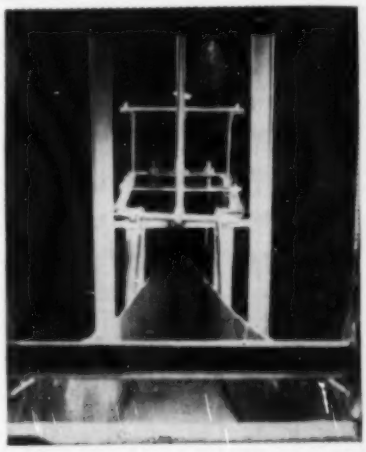


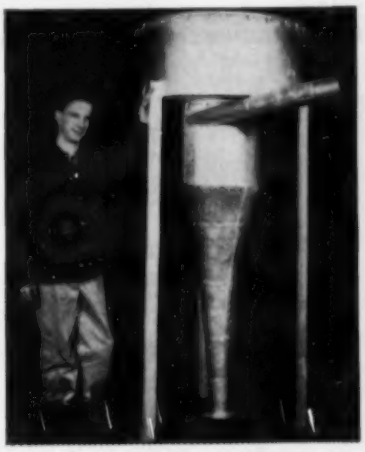
FIG. 3—TRANSITION TROUGH converts horizontal flow to vertical for higher separating efficiency. Adjustable blades in receiving box split discharge into products as desired



AUTOMATIC REGULATION is provided by spring suspension of launder trough.



CHANGE from horizontal trough to vertical discharge raises efficiency.



SIMPLE CYCLONE provides practical closed-circuit operation.

ders, however, is that the different products are classified horizontally along the bottom of a wide trough, making it difficult to effect a precise separation between adjacent beds. It would be easier to obtain a precise separation if the current could be guided through a narrow vertical opening, rather than flowing freely along a horizontal trough.

Launders incorporating this principle were developed by Hague, Becott, Stebbens and Schifferle, but were used only for the separation of such heavy minerals as gold, and their crude design resulted in failure when applied to coal preparation.

A group of French engineers felt, however, that a principle which appeared so sound and simple should work out in practice, and they undertook a systematic study of the different phenomena occurring when a horizontal stream is transformed into a vertical one. They soon discovered that the difficulty was essentially parasite currents, and they developed a new type of trough, called Lamex, which made it possible to pass gradually from a wide horizontal section to a narrow vertical opening without destroying the classification. Furthermore, the Lamex design takes advantage of the increased influence of the wall area to superimpose a classification by size on the classification by specific gravity. This action was described in a paper by Prof. Budryk at the International Mining Congress of Paris, in 1935.

At a time when the use of heavy-media processes has accustomed preparation engineers to expect laboratory results in an actual operating plant, the development of a new launder providing a greater precision in separation met with immediate success. Although the process was fully developed and patented only in 1948 in France and in 1952-53 in the U.S.A. and Canada, there are already 10 Lamex washeries operating in France, and the process has won a foothold in England and on the American continent. It is interesting that a century-old preparation process, with

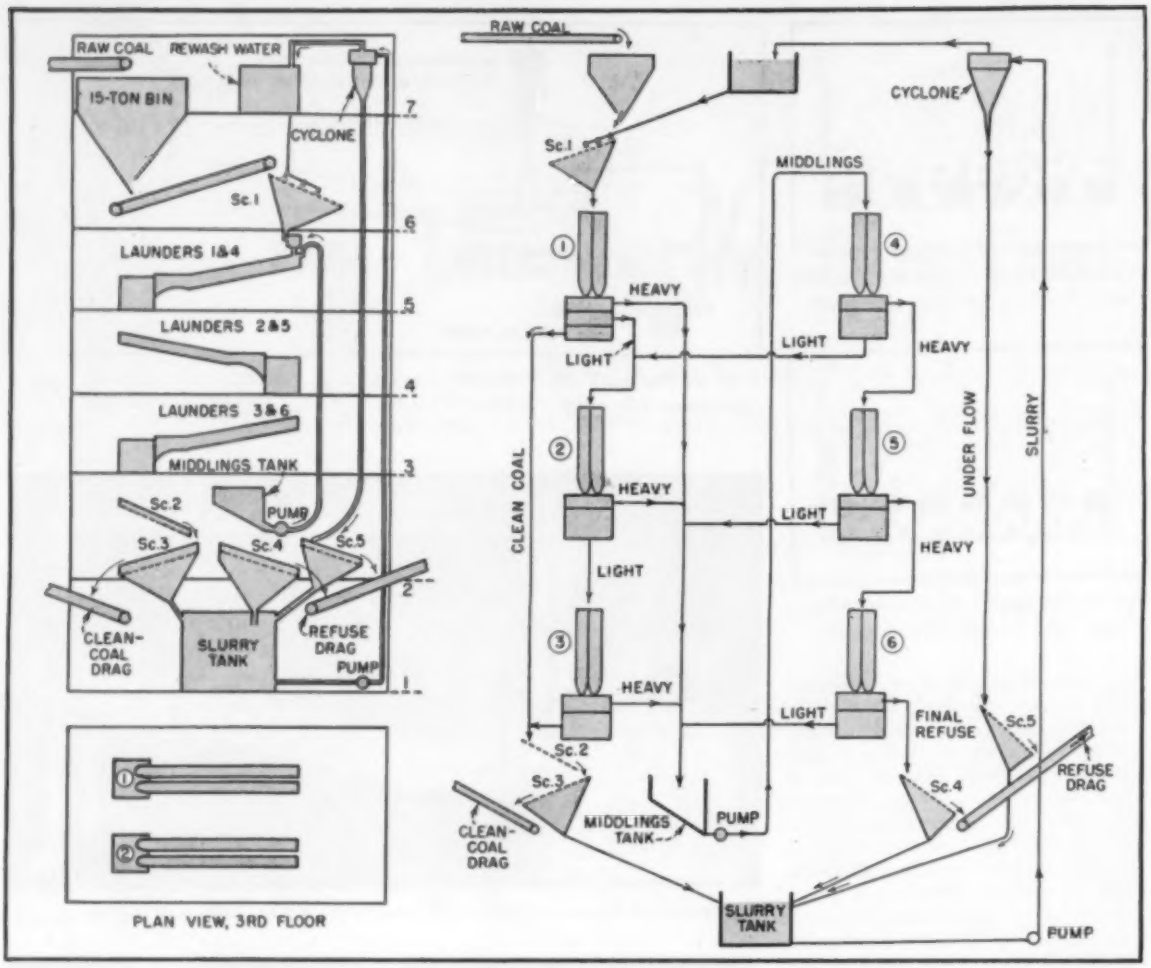


FIG. 4—EQUIPMENT ARRANGEMENT AND COAL FLOW in new launder plant of the West Canadian Collieries, Ltd.

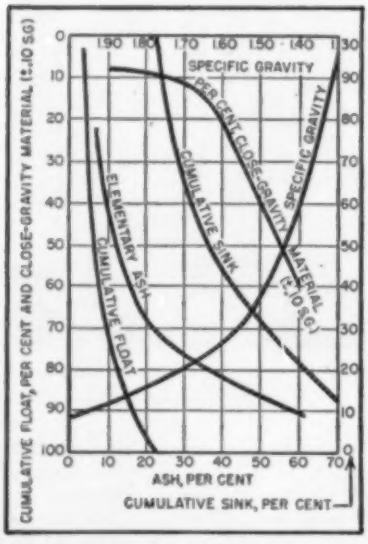


FIG. 5—WASHABILITY CURVES, raw 7/16x0 fine coal.

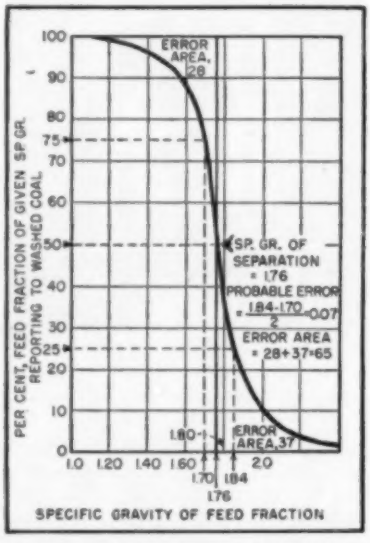

ERROR AREA, 28
SP. GR. OF SEPARATION = 1.76
PROBABLE ERROR = (1.84-1.70)/2 = .07
ERROR AREA = 28+37=65
ERROR AREA, 37
PER CENT, FEED FRACTION OF GIVEN SP GR. REPORTING TO WASHED COAL
SPECIFIC GRAVITY OF FEED FRACTION

FIG. 6—DISTRIBUTION CURVE resulting from launder operation.

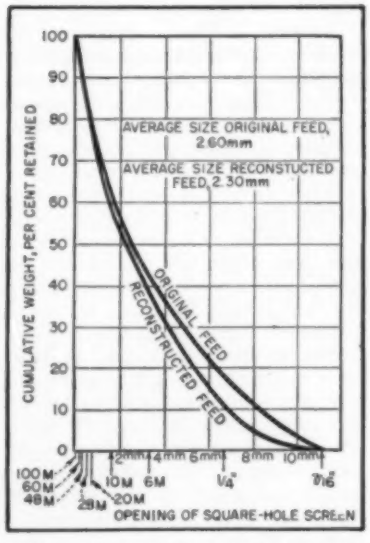


FIG. 7—SCREEN ANALYSIS of 7/16x0 feed to launder plant.

proper improvements, is more vigorous than ever in the age of heavy media.

LAUNDER DESIGN

The basic Lamex unit (Fig. 3) consists of the following:

1. A feeding trough 2 to 5 ft long with a rectangular section approximately 1 ft wide.

2. The patented Lamex transition trough ending in a vertical discharge (Sec. B-B).

3. A receiving box containing one or two cutting blades which can be adjusted vertically to cut the discharge from the Lamex trough at selected heights.

4. A suspension spring which acts as an automatic regulator. When the feed is overabundant or when it consists of abnormally heavy material, the end of the Lamex trough automatically lowers itself, thus permitting more material to flow below the lower blade toward the heavy-product circuit.

With a Lamex launder it is thus possible to effect a two- or three-product separation. Depending upon the particular situation, these products are considered as either final products, or products for retreatment on additional launders or for recirculation. A Lamex washery therefore may consist of one, two, three or more units in combination. Experience has shown that the maximum capacity of the Lamex trough for full efficiency is around 35 tph of feed. If larger capacity is desired, the most efficient solution is to parallel as many launders as necessary rather than attempt to use a single launder with more width.

LAUNDER CLASSIFICATION

As previously indicated, increased wall action on the flow of the material results, with the Lamex launder, in classification by size, which is the exact opposite of classification through hindered settling. From bottom to top, the products classified through hindered settling appear in the following order (Fig. 1):

Large, heavy particles.

Large, light particles and small, heavy particles.

Small light particles.

The products classified in the Lamex launder appear in the following order (Fig. 2):

Small heavy particles.

Large heavy particles.

Small light particles.

Large light particles.

This characteristic of the Lamex launder makes it immediately apparent that it is an ideal apparatus for retreating products rejected by machines utilizing the hindered-settling principle, such as, jigs. In a jig, the coarse light particles and the small heavy particles tend to settle in the same zone. When treating such a mixture, the Lamex launder will effect a sharp separation between the two, making it possible to recover a valuable product cheaply.

The three most popular Lamex applications today are:

1. Complete plants for the preparation of fine ¼x0 or ½x0 coal.

2. Complete plants for reclaiming refuse piles.

3. Addition of a few launders to the equipment in existing plants to retreat products rejected by jigs.

OPERATION ON 7/16x0

Our Lamex washery, as previously noted, was built to handle 70 tons of 7/16x0 per hour. The raw coal is delivered to a 15-ton bin on the top floor of the plant. From there, it is discharged to a screen installed to eliminate accidental oversize in the feed. Three rows of sprays thoroughly wet the coal, which is fed to Twin Launder No. 1 on the fifth floor. This unit separates the feed into three products:

1. Clean coal, which goes directly to the clean-coal dewatering screens (Sc. 2 and 3).

2. A light product, which is sent to the next twin launder, No. 2.

3. A heavy product, discharged to the middlings tank.

Twin Launder No. 2 delivers two products:

Table I—Float-and-Sink Data, 7/16x0 Raw Coal

Fraction Sink	Fraction Float	Direct Weight %	Direct Ash %	Cumulative Float Weight %	Cumulative Float Ash %	Cumulative Sink Weight %	Cumulative Sink Ash %	Sp. Gr.	% ±0.10 Sp. Gr. Close-Gravity Material
	1.30	6.1	3.2	6.1	3.2	100.0	22.0	1.30	41.3
1.30	1.40	31.9	6.4	38.0	5.9	93.9	23.2	1.40	60.0
1.40	1.50	23.5	12.6	61.5	8.5	62.0	31.8	1.50	38.8
1.50	1.60	12.3	20.8	73.8	10.6	38.5	43.5	1.60	19.9
1.60	1.70	6.0	32.0	79.9	12.2	26.2	54.0	1.70	11.2
1.70	1.80	4.3	40.0	84.1	13.6	20.2	61.5	1.80	9.3
1.80	1.90	4.2	51.0	88.3	15.4	15.9	66.5	1.90	8.6
1.90	2.00	3.7	61.0	92.0	17.2	11.7	72.0		
2.00		8.0	77.0	100.0	22.0	8.0	77.0		
Total....		100.0	22.0	....	....	....	....		

NOTE: In computing the percentage of close specific-gravity material, we have used a correction factor of 0.92, representing the total amount of feed floating in a solution of 2.00 sp. gr. For instance, the percentage of close-gravity material at 1.50, which appears as 23.5 ÷ 12.3, or 35.8%, has been reported as 35.8 ÷ 0.92, or 38.8%.

Table II—Specific-Gravity Analysis, Washed Coal

Fraction Sink	Fraction Float	Direct Weight %	Direct Ash %	Cumulative Weight %	Cumulative Ash %
	1.30	7.5	3.1	7.5	3.1
1.30	1.40	38.8	6.1	46.3	5.6
1.40	1.50	27.5	12.0	73.8	8.0
1.50	1.60	14.0	19.8	87.8	9.9
1.60	1.70	6.2	30.5	94.0	11.2
1.70	1.80	2.7	38.5	96.7	12.0
1.80	1.90	1.3	48.5	98.0	12.5
1.90	2.00	0.7	58.3	98.7	12.8
2.00		1.3	72.0	100.0	13.5
Total.....		100.0	13.5	100.0	13.5

Table III—Specific-Gravity Analysis, Refuse

Fraction Sink	Fraction Float	Direct Weight %	Direct Ash %	Cumulative Weight %	Cumulative Ash %
	1.30	0.5	3.2	0.5	3.2
1.30	1.40	3.6	8.2	4.1	7.5
1.40	1.50	6.2	15.1	10.3	12.1
1.50	1.60	5.1	23.4	15.4	15.9
1.60	1.70	5.1	35.1	20.5	20.6
1.70	1.80	10.7	44.3	31.2	29.0
1.80	1.90	16.4	55.1	47.6	38.0
1.90	2.00	16.4	66.0	64.0	45.0
2.00		36.0	80.5	100.0	57.8
Total.....		100.0	57.8	100.0	57.8

Table IV—Distribution Data

Fraction Sink	Fraction Float	Sp. Gr. Analysis in % of Products Washed: Feed	Coal	Refuse	Sp. Gr. Analysis in % of Feed Washed: Coal	Refuse	Distribution: % of Fraction Reporting to: Washed Coal	Refuse
	1.30	6.1	7.5	0.5	6.0	0.1	98.3	1.7
1.30	1.40	31.9	38.8	3.6	31.2	0.7	97.8	2.2
1.40	1.50	23.5	27.5	6.2	22.2	1.3	94.5	5.5
1.50	1.60	12.3	14.0	5.1	11.3	1.0	91.7	8.3
1.60	1.70	6.0	6.2	5.1	5.0	1.0	83.2	16.8
1.70	1.80	4.3	2.7	10.7	2.2	2.1	51.2	48.8
1.80	1.90	4.2	1.3	16.4	1.0	3.2	23.8	76.2
1.90	2.00	3.7	0.7	16.4	0.5	3.2	13.5	86.5
2.00		8.0	1.3	36.0	1.0	7.0	12.5	87.5
Total		100.0	100.0	100.0	80.4	19.6		

Total recovery washed coal: $\frac{57.8-22.0}{57.8-13.5}=80.8\%$.

Theoretical recovery from washability curve for washed coal at 13.5% ash, 84.0%.
Efficiency: 80.8 ÷ 84 = 96.2%.

Table V—Screen Analysis, Raw 7/16x0 Coal

	MM	Weight %	Ash %	Cumulative Weight
7/16 x 1/4	11.1 x 6.68	17.3	25.0	100.0
1/4 x 6M	6.68 x 3.327	25.4	24.2	82.7
6 x 10M	3.327 x 1.651	17.1	20.3	57.3
10 x 20M	1.651 x 0.833	17.5	20.2	40.2
20 x 28M	0.833 x 0.589	7.5	20.2	22.7
28 x 48M	0.589 x 0.295	6.0	20.1	15.2
48 x 60M	0.295 x 0.250	2.1	20.3	9.2
60 x 100M	0.250 x 0.147	4.6	21.2	7.1
100 x 200M	0.147 x 0.074	1.5	22.3	2.5
−200M	0.074	1.0	28.2	1.0

Cumulative ash, 22.0%.

Table VI—Screen Analysis of Products

	Washed Coal: Direct	% of Feed	Refuse: Direct	% of Feed	Sludge: Direct	% of Feed	Feed: Original	Reconstructed
7/16 x 1/4	9.0	6.6	20	3.4	....	....	17.3	10.0
1/4 x 6M	27.0	19.7	51	8.7	....	....	25.4	28.4
6 x 10M	22.4	16.5	19	3.2	....	....	17.1	19.7
10 x 20M	22.0	16.0	8	1.4	....	....	17.5	17.4
20 x 28M	12.6	9.2	0.6	0.1	....	....	7.5	9.3
28 x 48M	1.7	1.3	0.3	0.1	50	5.0	6.0	6.3
48 x 60M	1.1	0.6	0.3	....	10	1.0	2.1	1.7
60 x 100M	1.2	0.9	0.3	0.1	19	1.9	4.6	2.8
100 x 200M	1.4	1.1	0.3	....	13	1.3	1.5	2.5
−200M	1.6	1.1	0.2	....	8	0.8	1.0	1.9
Total, +28M	93.0	68.0	98.6	16.8	0	0.0	84.8	84.8
Total, −28M	7.0	5.0	1.4	0.2	100	10.0	15.2	15.2
Grand total	100.0	73.0	100.0	17.0	100	10.0	100.0	100.0

Table VII—Ash Contents of Products With Weights in Per Cent of Feed

	Washed Coal: Wt. %	Ash %	Refuse: Wt. %	Ash %	Sludge: Wt. %	Ash %	Original: Wt. %	Ash %	Reconstructed: Wt. %	Ash %
+28M	68	13.4	16.8	58.5	0	....	84.8	22.2	84.8	22.3
−28M	5	15.2	0.2	24.0	10	24.3	15.2	21.2	15.2	21.3
Total	73	13.5	17.0	58.0	10	24.3	100.0	22.1	100.0	22.1

1. A light product, sent on to the next launder, No. 3.

2. A heavy product, discharged to the middlings tank.

Twin Launder No. 3 delivers two products:

1. Clean coal, delivered to the clean-coal dewatering screens.

2. A heavy product, discharged to the middlings tank.

The middlings are pumped back to the fifth floor and are processed through Launders 4, 5 and 6, as shown in the accompanying flowsheet (Fig. 4). The final refuse is discharged by Unit No. 6 to the refuse-dewatering screen.

Slurry from the clean-coal and refuse screens is collected in a slurry tank, from which it is pumped to a cyclone on the seventh floor. The cyclone overflow goes to the rewash-water tank, while the underflow slides down onto the sludge-dewatering screen.

At the present time, the dewatered sludge is wasted with the refuse. We have found, however, that the Lamex launder does a good job of cleaning the minus 28M material, and therefore we are planning to recover most of our sludge by an additional launder followed by a centrifuge.

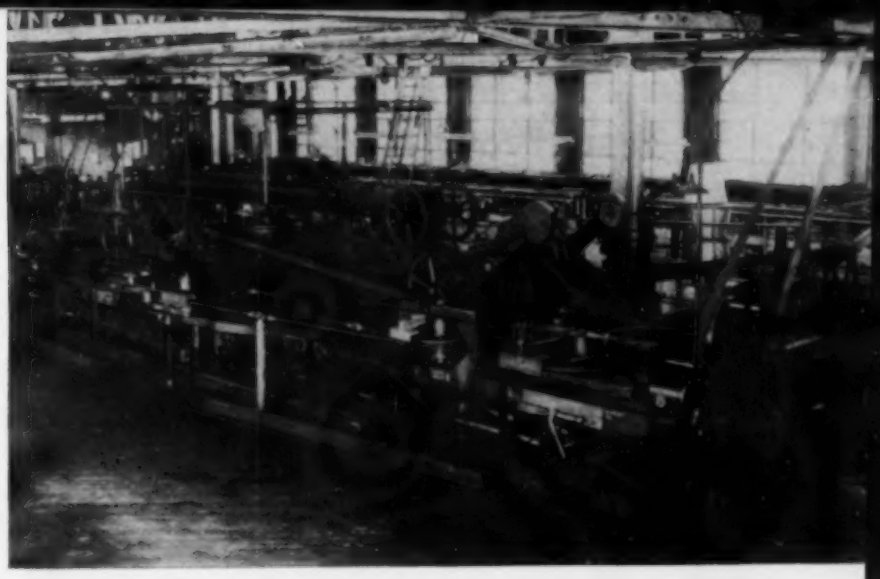
It will be noted that with the exception of the screens and two pumps, there are no moving parts in the washery.

WASHERY PERFORMANCE

The operating conditions and performance of our Lamex washery are shown in Tables I to VII and Figs. 5 to 7. It should be noted that severe Canadian winters make it almost imperative to operate in a closed circuit to avoid the nuisance of frozen pipes and ponds. The Lamex plant is run on that basis, with fresh water added only to replace the moisture removed with the products. A perfect closed-circuit operation would require an expensive and cumbersome water-clarification system. Although we have designed for such a circuit, we have found that in our situation it is more economical to be satisfied with the clarification provided by a simple cyclone, though such a simplified circuit may reduce plant efficiency slightly.

Design simplicity and lack of moving parts make a Lamex washery very economical to run and maintain. With due regard for the handicap of a closed circuit with over-simplified water clarification, we may further conclude that the data illustrating the performance of the plant (probable error, 0.07; efficiency, 96.2%) make this process one of the most efficient for fine-coal washing.

Can wire rope be effectively lubricated in operation, thus lengthening life and promoting safety? Tests on this fatigue machine provide definite evidence that . . .



Lubricant Does Penetrate Wire Rope

By W. I. LEX, Assistant Chief Engineer,
Wire Rope Engineering Div., John A. Roebling's Sons Corp., Trenton, N. J.

WHEN WIRE ROPE is lubricated in operation, the following very definite benefits result:

1. The fibers are preserved longer, helping maintain the core in good condition to afford proper support for the steel strands.

2. The rope is kept better lubricated internally as well as externally, helping to prevent corrosion and promoting safety in operation.

3. The maintenance of, so to speak, a "well-oiled" condition reduces friction, retards the development of fatigue, and adds not only to the life of the rope but to drum and sheave life as well.

New and carefully conducted tests show that lubricant applied in service does penetrate to the core of the rope and consequently does provide these benefits.

WHY LUBRICATE

No matter how thoroughly a wire rope is impregnated with lubricant during manufacture, lubricant loss starts as soon as the rope goes into service. Repeated squeezing of the core as the rope passes over drums and sheaves, and repeated application of tension, forces the internal lubricant to the surface where it is lost through abrasion and erosion. Even if the lubricant is not completely lost off the surface, it tends to combine with dirt and foreign material and in time becomes ineffective.

Considerable time and effort have been expended in the study of fiber cores and core lubrication, not only the new cores in new ropes but also old cores from ropes that have completed their service. One of the important factors is the quantity of the lubricant in the core, which we measure as a percentage of the original, or lubricated, core weight.

The core in a new rope generally contains 12 to 15% of lubricant. It could hold more, but since it is to go into the rope, any attempt at heavier lubrication would be futile because any excess over 12 to 15% would be squeezed out when the core is compacted by closing the steel strands of the rope around it. When the rope goes into service, the tension on the strands and the kneading action resulting from operation over drums and sheaves results in further compaction of the core. This occurs during the initial service period while constructional stretch is being removed. The open area between fibers becomes less and the core can hold only 8 to 12% of lubricant, though this can vary considerably with the type of service.

From this point on, the ability of the wire rope to afford safe and economical service depends to a large extent upon whether it is properly lubricated in operation. Good lubrication will help maintain the level of internal lubrication, whereas poor practice will result in a continued decrease in the percentage.

We have examined many cores from worn ropes where proper lubrication has been maintained. We also have examined many where the lubricant percentage had fallen to less than 5%, and several where the percentage was less than 3. In two instances where the lubricant in the core was down to 2.4% in the most-worn section of the rope, examination of core sections from ends which had not been subject to passage over sheaves showed 12.7 and 14.5%.

The most striking fact revealed in our examination of ropes is that the ropes that have rendered exceptionally fine service are always those with the larger percentages of lubricant in the cores. This shows up in successive ropes from the same installation where lubrication practice has varied from good to poor, and in different but similar installations where variations in lubricating practice have resulted in marked differences in safety and economy of operation. Always where good lubrication prevails, the core has been found to contain more lubricant as a result of either penetration of lubricant applied during service or better retention of the original lubricant.

Where lubricant is not applied dur-

Tests Prove Benefits of Wire-Rope Lubrication

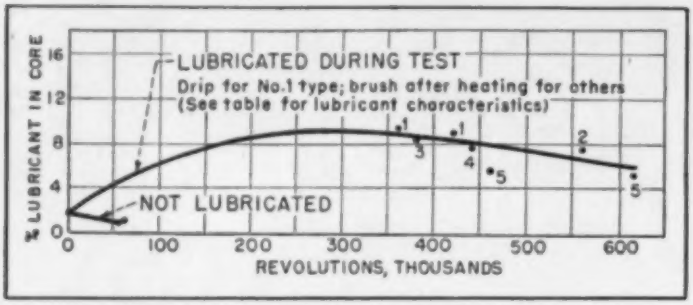

% LUBRICANT IN CORE
LUBRICATED DURING TEST
Drip for No.1 type; brush after heating for others
(See table for lubricant characteristics)
NOT LUBRICATED
REVOLUTIONS, THOUSANDS

FIG. 1—LUBRICANT PENETRATION into dry-core dry-strand ropes contrasted to loss from nonlubricated ropes. Initial core lubrication was 1.6% in both instances.

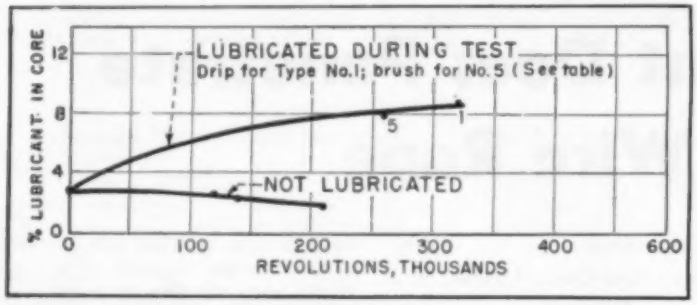

% LUBRICANT IN CORE
LUBRICATED DURING TEST
Drip for Type No.1; brush for No.5 (See table)
NOT LUBRICATED
REVOLUTIONS, THOUSANDS

FIG. 2—LUBRICANT PENETRATION into dry-core lubricated-strand ropes ups original core level of 2.6%, while test operation without lubrication results in loss.

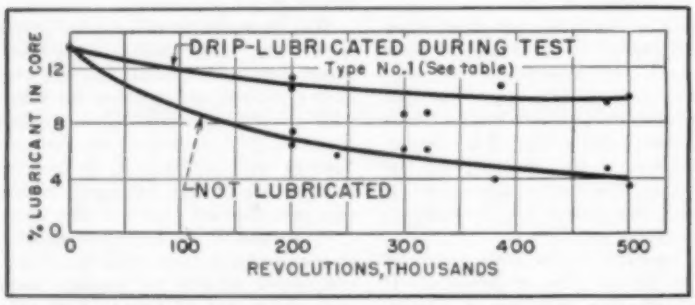


FIG. 3—LUBRICATION during test operation keeps core level much nearer the original 13.5%, compared to operation without lubrication.

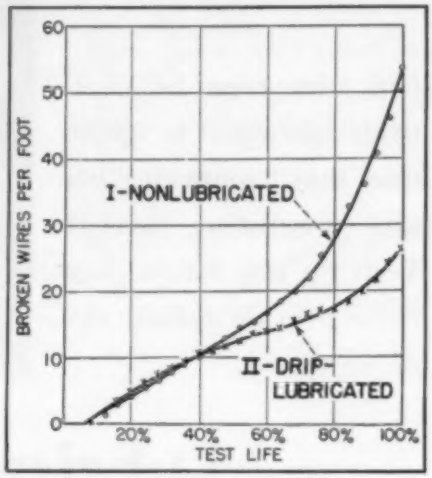


FIG. 4—ROPE LIFE LENGTHENED by lubrication. Eight ropes used in each test, one group run without lubrication and the other with. Nonlubricated ropes removed when inspection showed 50 or more broken wires per foot. Corresponding lubricated ropes removed at same number of test revolutions. After 40% of test life, nonlubricated ropes showed far more broken wires than lubricated.

Lubricant Characteristics

(Numbers correspond to numbers used in Figs. 1 to 4)

1. Fluid petroleum oil, 77.5 viscosity at 210 F.

2. Petroleum lubricant, 106 F melting point, 334 viscosity at 210 F.

3. Semi-fluid grease containing 1.2% soda soap.

4. Mixture of 50% petroleum, 150 to 165 F melting point, 110 to 130 viscosity at 210 F, with 50% SAE No. 70 mineral oil.

5. Petrolatum, 150 to 165 F melting point, 110 to 130 viscosity at 210 F.

ing operation, or where it was improperly applied, the result invariably is curtailed rope life, sometimes with disastrous consequences. If lubricant is not replenished in service, the fiber core gets drier and drier. The individual fibers are cut and chewed and the core, as a whole, is reduced in diameter to the point where inadequate support is afforded the strands. If water is present, the dry fibers absorb it, with increased tendency toward internal corrosion—a particularly serious consideration with some mine waters. If excessive moisture is not present, the dry fibers may abrade the steel wires and reduce the metal area of the rope.

PROOF BY TEST

These facts about the characteristics of fiber cores are known to those who have worked with wire rope and have examined and studied used ropes. They may not be so apparent to others, which was the reason for conducting the tests outlined in this article. These tests offer proof of the following statements:

1. It is possible for the fiber core of a wire rope to absorb lubricant, applied externally, during its period of service.

2. Operation of a wire rope over sheaves and drums under tension tends to reduce the lubricant in the fiber core.

3. Proper external application of lubricant during operation materially helps in maintaining a better lubricated condition of the fiber core.

4. Proper external application of

lubricant during operation lengthens rope life.

All tests were made on the fatigue machine shown in an accompanying illustration, using ⅝-in rope tested under a tension of 5,000 lb.

Eight different ropes can be tested on the machine at one time. Each specimen is operated over a 24-in-tread-diameter test sheave, and the total wrap is 180 deg. Motion is imparted to the ropes by a reciprocating carriage driven to provide approximately 850 revolutions per hour. In each revolution, the rope travels its full length around the sheave in each direction.

At the conclusion of each fatigue test, the quantity of lubricant in the fiber core was determined by the use of the Soxhlet extractor, which also was used to determine the percentages in unused fiber cores and in cores from new and used rope.

LUBRICANT PENETRATION

To provide proof of the statement that the fiber core of a wire rope will absorb lubricant applied externally during service, two lengths of special ⅝-in 6x19 right regular lay fiber-core ropes were fabricated. One length was made with dry core and dry strands, and the other with dry core and lubricated strands. The same dry core was used in both, "dry" meaning no lubricant except the cordage oil used by the manufacturer of the core.

Extraction tests of this dry core before fabrication into the wire ropes indicated 1.6% lubricants. Samples of the dry-core dry-strand rope also tested 1.6%, while the core from the rope with lubricated strands showed 2.6%, indicating some pickup from the strands.

On the fatigue machine, the dry-strand dry-core ropes broke after only 54,000 and 60,000 revolutions. Soxhlet extraction tests on the cores showed that the lubricant had been reduced from 1.6 to 0.9%.

Other samples were lubricated during the test in two ways: drip with a fluid petroleum oil, and brush with heated lubricants. Lubricant characteristics are shown in the accompanying table. These ropes ran 360,000 to 614,000 revolutions before they were removed from the fatigue machine. Extraction tests showed that the cores still contained 5.5 to 9.3% lubricant, compared to the original 1.6% before lubrication.

These results definitely indicate that the fiber core absorbed lubricant applied to the surface by dripping or brushing it on during the test.

The next series of tests was run with dry-core lubricated-strand rope, the fiber core, as previously noted, containing 2.6% lubricant, of which 1.6% was cordage oil. The same general lubrication procedure was followed during the test.

Fig. 2 shows the results of this test. While some improvement was obtained with the non-lubricated ropes, compared to the dry-core dry-strand ropes, it was necessary to remove the specimens from the fatigue machine at 120,000 to 209,000 revolutions. Extraction tests showed core-lubricant percentages of 1.8 to 2.2%, compared to the original 2.6%.

The ropes lubricated during the test by the drip and brush methods were removed from the fatigue machine after running 260,000 and 320,000 revolutions. Lubricant content of the cores was 8.1 and 8.7%, compared to the original 2.6%. It was again quite evident from these tests that the fiber core will absorb lubricant applied externally during operation.

LUBRICANT RETENTION

Two series of tests were run to show (1) loss of lubricant from the core during service and (2) how surface application maintains lubricant level in the core. The tests were run with rope where the fiber core and strands had been lubricated in the regular manner in manufacturing. Core lubricant content was 13.5%.

Eight test lengths were run without application of lubricant to the ropes during the test. Extraction tests were run on the cores at intervals ranging from 200,000 to 500,000 revolutions. Lubricant percentages varied from 7.3 down to 3.4%, compared to the original 13.5%. The losses represented lubricant squeezed out between the strands of the rope while it was bending over the sheaves under tension.

The second eight test lengths were run the same as the first set except that they were drip-lubricated with fluid oil (Lubricant No. 1 in table) during the test. The lubricant content of the cores was checked at the same intervals as the first group. Lubricant percentages, as shown in Fig. 3, ranged from 8.6 to 11.2, indicating that lubrication during operation will not maintain the percentage in the core at its original level. The results very clearly show, however, that the fiber core will absorb some lubricant and that a better condition is maintained when lubricant is applied externally during operation.

ROPE LIFE

It was previously stated in this article that external application of lubricant during operation lengthens rope life. The results of tests on two sets of eight ropes confirm this statement.

One set was run with drip lubrication, the other without. All ropes were carefully inspected at intervals of 20,000 revolutions and the broken wires were counted at these intervals.

Average results for the nonlubricated set are shown in Curve I of Fig. 4. These ropes were removed from the fatigue machine when somewhat more than 50 broken wires were counted in 1 ft, this degree of deterioration being taken as the termination of the test (100% test life).

Curve II of Fig. 4 shows the results from the drip-lubricated set. The story represented by this curve is quite different in that only approximately half the number of broken wires was found at the end of the test, meaning the same number of revolutions as the ropes in Curve I.

This is definite evidence that lubricating a rope during operation greatly reduces the internal friction between rope components, as well as between the rope and the sheave grooves. Furthermore, by keeping the fiber core in better condition, the support necessary to insure proper movement of the steel strands is maintained to a greater extent. These factors automatically reduce the fatiguing action to which a rope is normally subjected when bending over sheaves under tension.

Another significant fact shown by the curves in Fig. 4 is that the original lubricant in the rope had its maximum effect up to only approximately 40% of its test life. From this point on, the broken wires began to show up more rapidly in the non-lubricated test ropes (Curve I), but at only a moderately higher rate in the lubricated ropes.

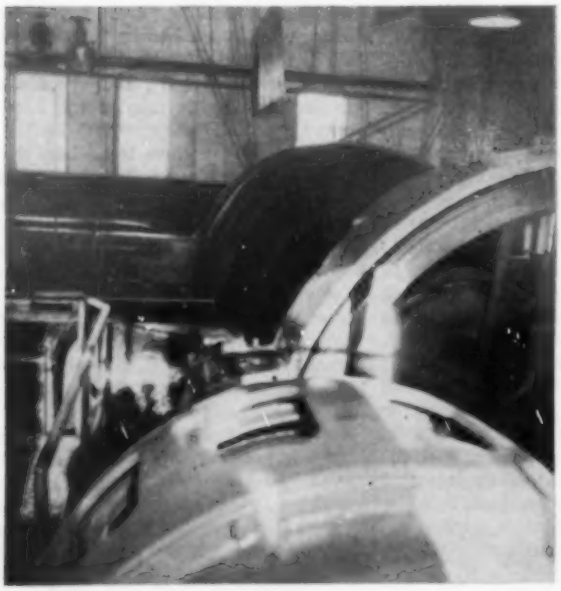
The results of these tests show that lubricant properly applied does penetrate a wire rope during application, with the attendant advantages listed at the beginning of this article, even though laboratory tests such as those described necessarily must be made under accelerated conditions to permit completion in a reasonable time. In making these tests, however, field conditions were duplicated as nearly as possible. Actually, it was felt that somewhat more severe conditions were imposed by operating the ropes over 24-in-diameter sheaves and under 5,000 lb of tension. This combination produced a greater fatiguing action and far higher pressures tending to squeeze lubricant out of the core of the rope than would be encountered in most actual installations.

COAL SHAFT

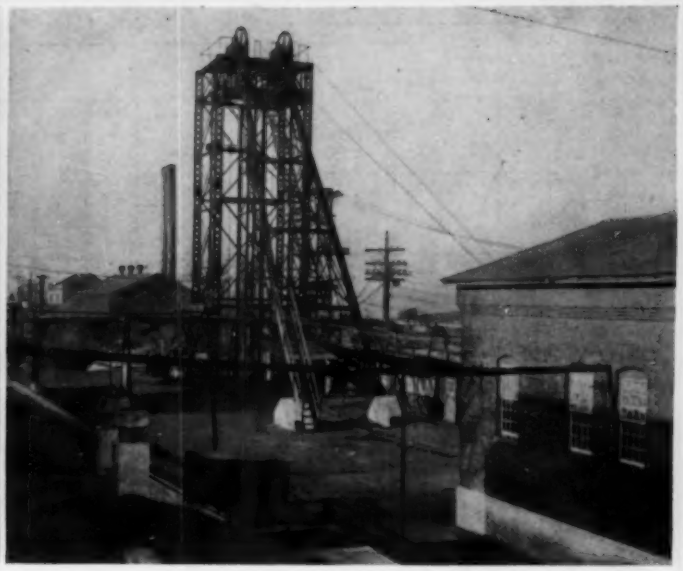
A MASTER SWITCH in place of a throttle highlights the change in hoisting practices at Olyphant, where a 600-hp slip-ring motor has replaced a pair of steam engines for hoisting 600 loads per shift from 414- and 735-ft levels.

Saving by Improved Hoisting

Conversion from steam-powered to electric hoisting at Grassy Island mine results in substantial savings in colliery fuel and boiler-room labor, and permits fuller use of available electrical equipment.



THE 600-HP MOTOR (foreground, left photo) drives cylindro-conical drum through company-designed coupling (right). Four steam engines were retired here in the change to electric power and the elimination of two hoisting compartments.



SERVICE SHAFT HOISTING POWER at the two-compartment man-and-supply shaft is provided by a 250-hp slip-ring motor. Six 270-hp boilers have been practically eliminated, thus releasing for sale a substantial tonnage formerly used in steam generation.

SIGNIFICANT SAVINGS in over-all operating costs at the Grassy Island mine of The Hudson Coal Co., Olyphant, Pa., have been realized through the replacement of steam-powered hoisting engines with electric drives at the four shaft compartments at the mine. By-products of the electrification, contributing substantially to the total savings, include (1) the elimination of most of the steam-generating capacity at the mine with a consequent release of 12,000 tons per year of barley-size anthracite formerly consumed as colliery fuel and (2) direct labor savings, primarily in the boiler room.

Hoisting facilities at the mine must provide service for a two-compartment coal shaft and a two-compartment man-and-supply shaft. Duty at the coal shaft requires hoisting 530 cars of coal, each 3 tons net, and 70 cars of rock in a 7-hr shift, taking into account normal shaft delays. Cars are hoisted from two landings, the Clark vein at a depth of 414.25 ft and the Dunmore vein at a depth of 735.75 ft, at a maximum rope speed of 1,750 fpm. The coal shaft formerly was a four-compartment shaft with two compartments serving upper levels, but progressive depletion at the upper levels permitted these compartments to be sealed.

REPLACING STEAM POWER

The units retired from service include two 28 x 48-in and two 20 x 30-in steam engines at the coal shaft and two 20 x 30-in engines at the manshaft. The engines at the coal shaft had been installed in 1903 when operations at Grassy Island began, and the units at the manshaft were installed in 1909.

The replacement drives are a 600-hp wound-rotor Westinghouse Type CW motor at the coal shaft and a 250-hp motor at the service shaft. Both are designed for primary reversing and secondary acceleration at 2,300 v AC. The motors are those formerly used at other slopes operated by the company but eventually worked out. The changes at Grassy Island, therefore, result in fuller utilization of the company's available equipment as well as providing the savings previously mentioned.

In preparing the 600-hp motor for its new duties, the electrical department of the company rewound the stator with Class B insulation and provided oil circuit-breaker equipment on the incoming 2,300-v line. Most of the other necessary control equipment was available in company stocks.

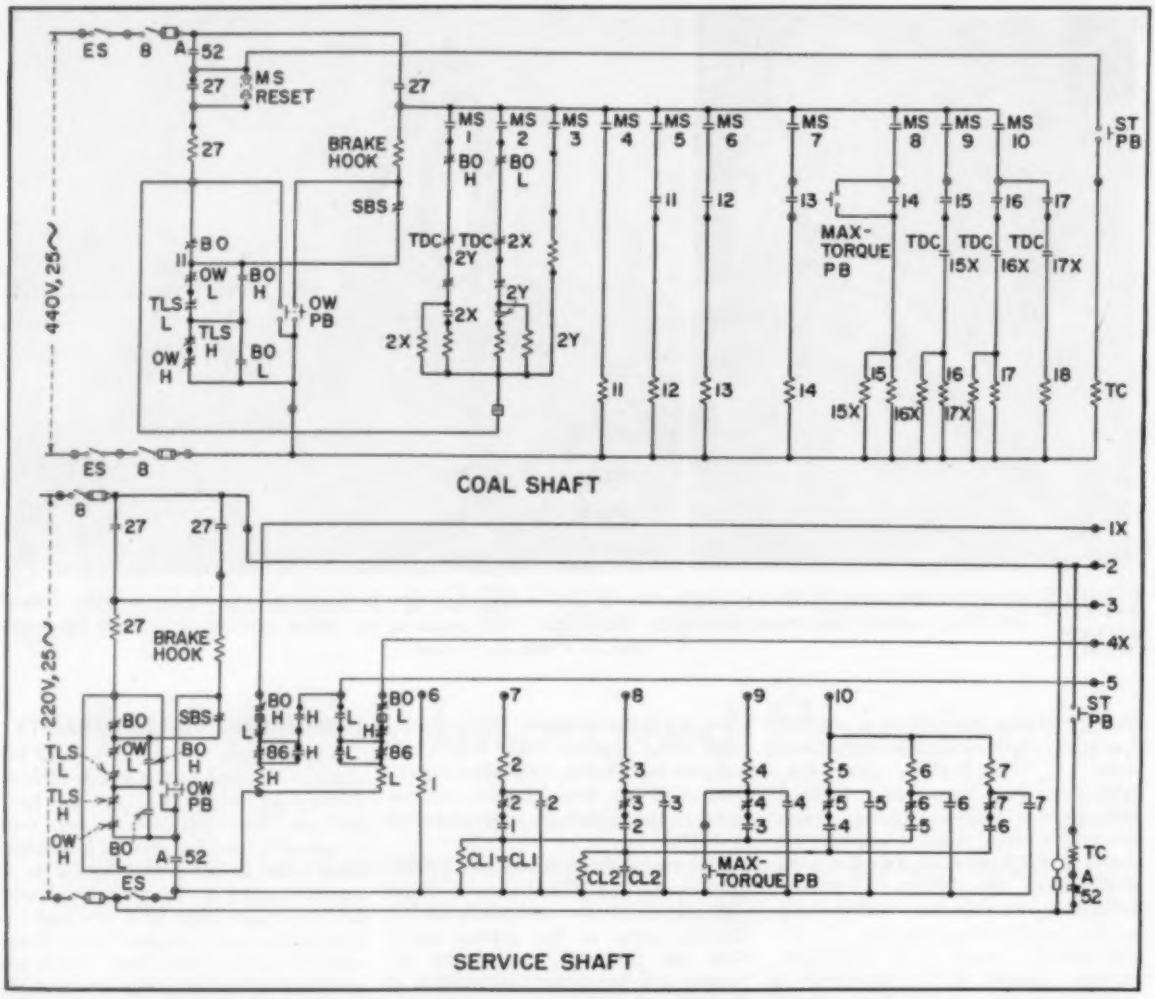
The new units operate on company-generated power. Olyphant colliery, including Grassy Island and Eddy Creek mines, operates its own power plant. During peak periods purchased power is used to supplement the company-generated power. Off-peak power is furnished by the company power plant, thus making the operation of this plant more economical by operating it at a high load factor.

ELIMINATING BOILER CAPACITY

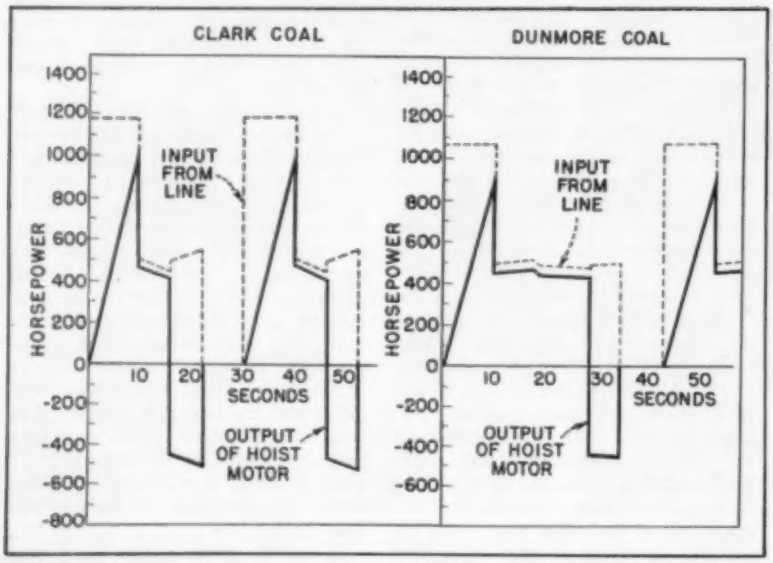
The changes at the steam plant include the complete retirement of four 270-hp Sterling boilers and the low-pressure operation of one such unit to provide heat for surface buildings. One other boiler is maintained as a spare. Grates in the operating boiler and the spare have been replaced by Pyramid grates, furnished by the Pyramid Grate Co., New York, which are designed to permit deep firing at infrequent intervals, thus reducing attendance time. In one or two visits per day, a man can feed enough coal into the boiler to adequately carry the load. Automatic draft controls have been added to eliminate boiler-room labor.

The elimination of colliery steam affected other mine services such as ventilation, air-compressor operation and rock disposal, all formerly powered by steam. After reducing the speed of the fan because of lower air requirements, the original 180-hp drive on the fan was replaced by a 100-hp electric motor. Two air compressors, one on the surface and one in the mine, also were electrified. A steam-powered hoist at the rock-disposal plane shown in the photo was eliminated and the operation of the plane was discontinued. Rock cars from Grassy Island now are hauled to disposal facilities at nearby Eddy Creek which are adequate to handle rock from both mines.

Incoming power enters the Grassy Island substation at 23,000 v, 25



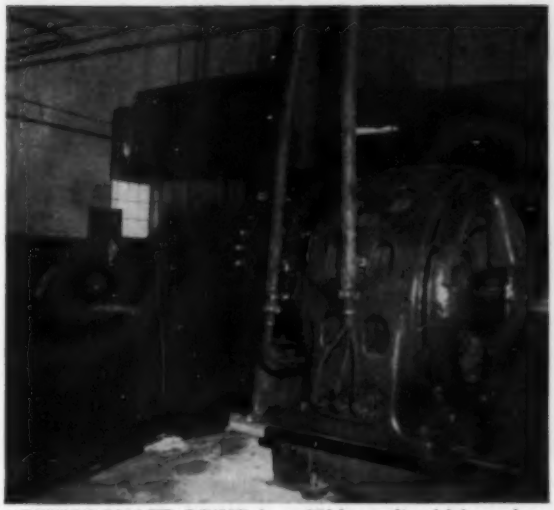
SCHEMATIC CONTROL DIAGRAMS for both coal and service shafts illustrate safety features in electric hoisting.



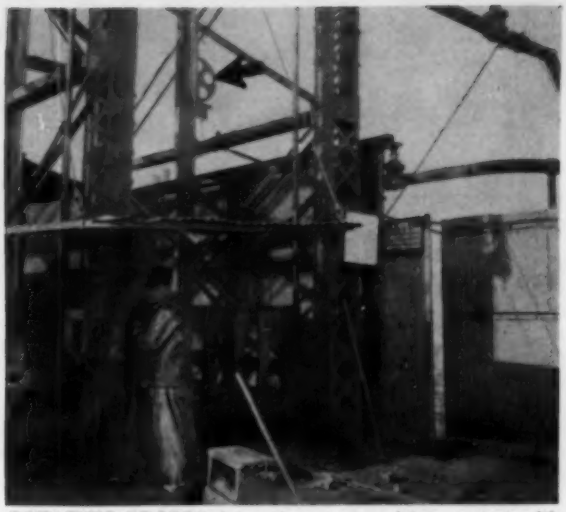
DUTY CYCLES show motor loads in hoisting from both levels in coal shaft.

LEGEND:

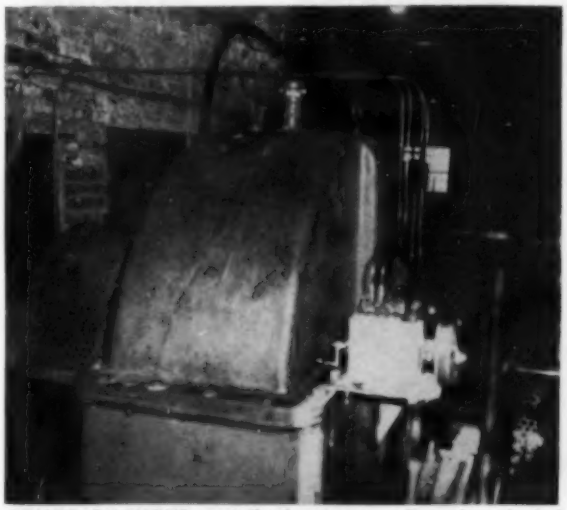
- 8 Control-power switch
- 27 Undervoltage relay
- 52 Oil circuit-breaker
- 86 Lock-out relay
- a—"a" switch on OCB
- H—Hoist
- L—Lower
- BO—Backout
- ES—Emergency switch
- MS—Master switch
- OS—Overspeed
- OW—Overwind
- PB—Pushbutton
- SBS—Slack-brake switch
- ST—Shunt trip
- TLS—Track limit switch
- TC—Trip coil
- TDC—Time-delay closing
- CL—Current limit
- X,Y—Auxiliary relays



SERVICE-SHAFT DRIVE is a 250-hp unit which replaces two 20x30-in steam engines in serving four levels.



ROTATING PROBES (arrow) assure positive contact with cages in the event of overwinds.



OTHER CHANGES contributing to over-all savings include electrification of ventilating fan and air compressors and the elimination of a steam-powered hoist at the rock-disposal plane shown in the right photo.

cycles, and is stepped down to 2,300 v by two 2,000-kva 3-phase transformers.

PROVIDING SAFE HOISTING

As shown in the elementary control diagrams, the Grassy Island hoists are equipped with recommended safety devices, such as: (1) overwind protection and the associated back-out circuits to safely correct overwinds; (2) a master-switch reset which requires that the master switch must be returned to the neutral position if for any reason the elements in the safety circuit interrupt the flow of control power; (3) track-limit switches in the headframes, designed by Hudson's electrical engineers, which interrupt control power if the cages are hoisted too far; (4) slack-brake switches which open the control circuit when the brake bands have worn down to a predetermined degree; (5) an emergency switch within reach of the operator by which he may open the control circuit; and (6) overspeed switches which prevent operators from approaching landings too fast.

Finally, the controls include a foot-operated maximum-torque switch which short-circuits the first accelerating steps when heavy loads are to be lifted away.

A combination of time-limit and current-limit relays is employed in monitoring acceleration at the coal-shaft hoist and current limit at the manshaft to assure that secondary current has decayed to the proper value before each accelerating resistor is short circuited.

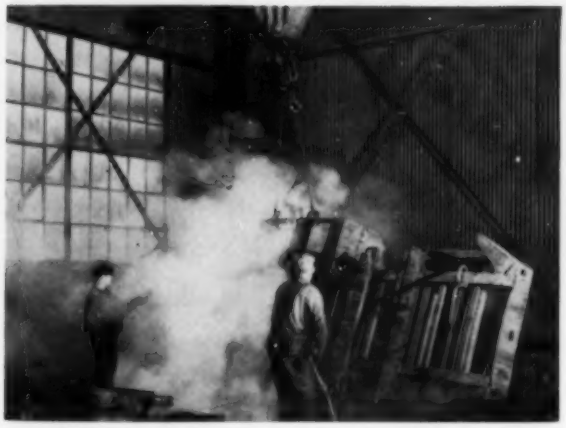
Operations were suspended at the mine during the changeover, which was made in the summer of 1953. Within a short time after work was resumed, however, production was back to normal, about 1,600 tpd. All hoisting is done on the first shift, although the mine works two shifts.

Plans covering this improvement were designed by the Hudson's electrical department, under the direction of L. H. James, electrical engineer, who retired as of Jan. 1, 1954. The project was the particular assignment of R. H. Demmy, assistant electrical engineer, who stayed on the job from the start. Mr. Demmy has been named electrical engineer to replace Mr. James.

CLEANING, DISMANTLING AND ERECTION SHOP is 43½x178 ft. Leanto structures house supply room, electric shop and controller shop. Heavy metal work, such as rebuilding shuttle-car frames, is done in another 61x134-ft bay.

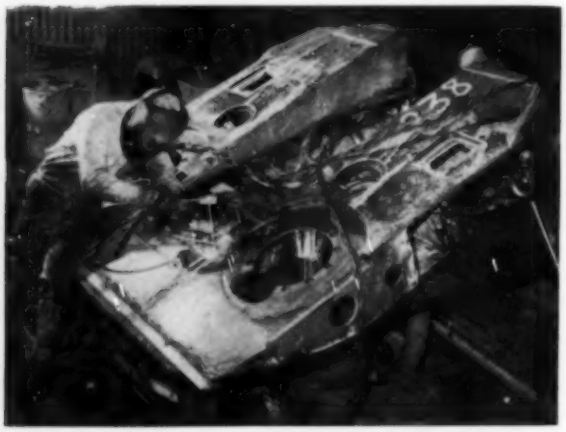
Cleaning . . . Dismantling . . . Rebuilding . . . Erection

ROCK LOADER waits its turn to enter the plant for rebuilding to original specifications.



STEAM CLEANING prepares frame of this shuttle car after removal of motors, controllers, etc.

REBUILDING shuttle-car body. Extra-heavy frames may be installed to meet severe local conditions.



CONVERSION to super-loader includes new wearing plate, nose shoe, conveyor plate and hinge-pin tubes.

Custom Machine Rebuilding

How an industry central shop serves the mines

HOW TO REBUILD production equipment has become more and more a factor in mining operations as a result of the increasing use of machines and machine methods to meet the competition of other fuels. With this increasing use of machines, manufacturers and operators have intensified their efforts to develop more and better equipment to cut production costs. These highly engineered and complex machines present mining companies with a difficult maintenance and rebuilding problem.

Rebuilding to maintain efficiency not only requires mechanics and electricians skilled in this work but also a plant with adequate machining facilities and a large and expensive supply of parts and materials—that is, if the machines are to be brought back to initial operating condition at an economical cost and in the shortest practicable time consistent with the value of the equipment idled.

TEN-STEP REBUILDING

Attaining the preceding objective in rebuilding necessarily involves an investment in facilities beyond the reach of all except the larger companies. But appreciation of the values and benefits of good rebuilding has resulted in the development of independent rebuilding plants with all the facilities required for efficient reconditioning—and also improvement—of the major types of mining equipment. The Ashland Div. plant of the National Mine Service Co., for example, follows this procedure in rebuilding such units as loaders, shuttle cars, cutting machines and continuous miners:

1. Remove motors, speed reducers, wheel units, controllers, etc.
2. Steam clean frame and component parts with a cleaning compound containing a chemical that prevents rusting after the parts have been cleaned.
3. Transfer main frame and parts to departments specializing in their rebuilding.
4. Carefully dismantle each assembly and closely inspect all parts.
5. Replace all worn and defective parts with new ones.
6. Rebuild main frame, using welders and sheet-metal men, while the separate machine units are being rebuilt in their respective departments.
7. Coat all exterior surfaces of units and main frame with a rust-inhibiting paint before reassembling the machine.
8. Reassemble in particular bay allotted to the machine as soon as rebuilt parts are available.
9. Conduct tests successively as each step in assembly is completed to insure that each unit is in good operating condition; make final tests of the completed machine.
10. Move machine to paint-spray room for final painting and return it for drying and delivery to the mine.

Establishment of the Ashland Div. as a new means of meeting the need for efficient rebuilding reflected an evolution in demand for this service and in effective ways of achieving rebuilding objectives. In 1947, National Mine Service was authorized by the Joy Mfg. Co. to distribute genuine Joy parts and rebuild Joy equipment. It had previously acquired the All-State Equipment Co., Logan, W. Va., which became the second company unit with extensive repair and rebuilding facilities. The first—the Beckley Machine & Electric Co., Beckley, W. Va.—had a large shop and warehouse. With these two units, operating as the All-State and Bemeco divisions, the company established itself as a rebuilder of all types of mining equipment, but principally Joy.

SPECIALIZATION MORE NECESSARY

In addition to the growing demand for rebuilding service, experience in the All-State and Bemeco divisions led to the conviction that specialization was necessary for effective rebuilding, meaning renewing equipment to original standards, on a definite schedule, and at the lowest possible cost. This touched off a 2-yr search for a new plant site most central and convenient to all the coal-producing fields east of the Mississippi River.

Based on equipment in service, the Charleston-Ashland-Huntington district appeared to be the best location. Early in 1952, a vacated steel products plant at Ashland, Ky., which possessed many of the requirements, was found to be available. The site was on the main line of the Chesapeake & Ohio Ry., with a private siding, and was close to the Norfolk & Western and Baltimore & Ohio lines in Kenova, 12 mi away. U. S. Highway 23 runs practically alongside the plant, and within a few miles are Highways 60, 52, 7 and 75.

Another factor influencing location at Ashland was the fact that the area is heavily industrialized and thus provides a reservoir of the types of labor — machinists, electricians and welders — necessary for high-quality mine-equipment rebuilding. On Oct. 1, 1952, within 6 mo following purchase, the completely remodeled and renovated plant, fully implemented for its specialized work of rebuilding Joy mining equipment, was opened as the Ashland Div. of the National Mine Service Co., with facilities as follows:

MAIN BUILDING

Two bays, separated by structural steel columns; one bay, 43½x478 ft; the other, 61x134 ft; both equipped with bridge cranes.

Total floor space, 43,000 sq ft.

Area of plant site, 6¼ acres.

EQUIPMENT

12-ft press brake for shaping steel plate.

12-ft shear for cutting steel plate.

8-ft rolls for bending steel plate; capacity to ⅝ in.

50-kw spot welder.

Pantograph acetylene cutting machine; capacity, 6x12 ft sheet.

Horizontal boring mill.

4 engine lathes.

Banding lathe for armature banding, commutator turning and undercutting.

14 arc welders, 300- to 600-amp.

50-kw synchronous converter.

Load tester for motors.

Universal milling machine; horizontal and vertical.

800-ton hydraulic press, horizontal.

6-ft radial drill.

Boring mill with 4-in bar.

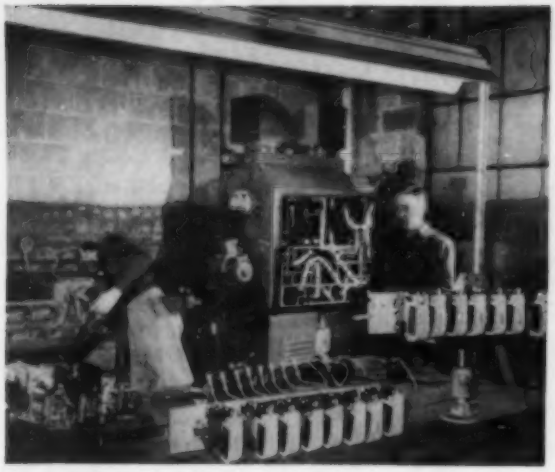
75-ton hydraulic press, vertical.

Post drill and grinder.

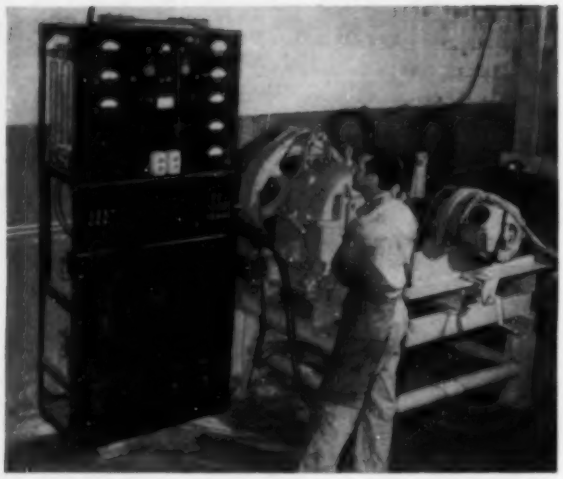
8x24x10-ft spray booth.

NORMAL RETURN 30 DAYS

With these facilities, the Ashland plant is now turning out 15 or more rebuilt units per month, in spite of the drop in coal production. Plant capacity is available and plans are under way to expand output to 25 to 30 units per month. The usual schedule calls for returning the rebuilt unit

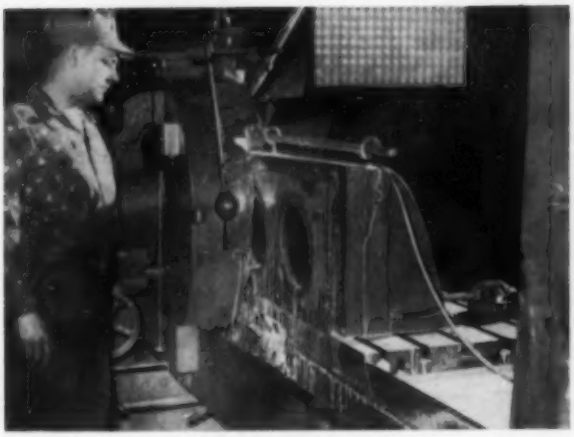


CONTROLLERS are completely disassembled, cleaned, parts renewed and rewired to factory standards.



FULL-LOAD TEST on a 7½-hp crawler motor for loading machine is one of several in rebuilding.

Electrical Rebuilding . . . Quality Testing

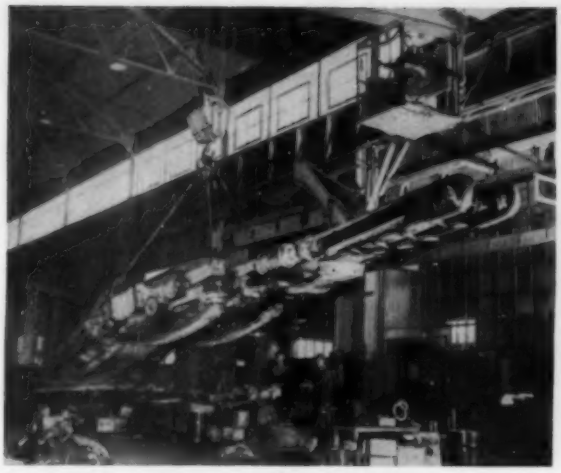


SURFACE GRINDER refaces cover plate of shuttle-car controller to restore fit. Magnetic chuck saves set-up time and avoids cover distortion and inaccuracies.

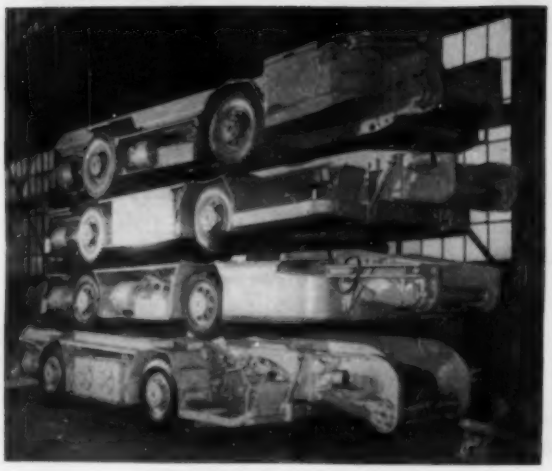
CONTRASTS in shuttle-car controller cases, showing rusted and pitted flange surfaces before surface grinding to restore close permissible fit.

REBUILT MOTORS ready for final assembly into their respective mining units.

SETTING CLUTCH with ammeter in final loader test. Left is high-voltage tester; above, volt-ohmmeter.

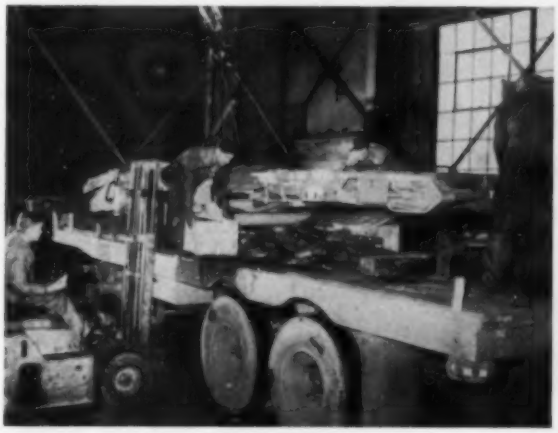


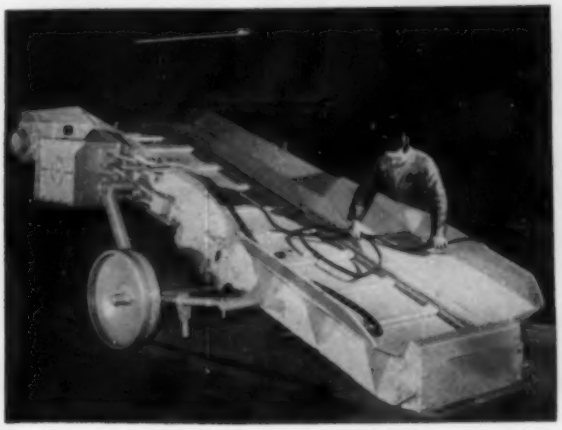
REBUILT LOADER on its way to the paint shop. Cranes easily handle heavy equipment.



FOUR REBUILT shuttle cars ready for return to the service at the mines.

Final Conditioning . . . Return to Service





LOADING REPLACED PARTS with rebuilt loading machine. The loader arrived back at the Illinois mine from which it was picked up 24 hr after this picture was taken and less than a month after it left. Right view shows cable being coiled into a rebuilt elevator after final testing.

to the mine within 30 days of the time it is picked up.

To assist the user in emergency by completing a job before a regular schedule date, rebuilding is often possible in a much-shorter period by double shifting so as not to interfere with the schedule of other work. In one instance, a shuttle car damaged by a roof fall was trucked to Ashland, rebuilt, and returned to the mine within 2 wk, rather than the usual 30 days.

In addition to skilled labor and good plant facilities, maintenance of this schedule involves good pickup and return of equipment, availability of parts and supplies, and skilled supervision. Operations at Ashland, for example, are directed by three men of long experience in maintenance of mining machinery, much of it with coal companies. These men are: C. E. Suiter, general manager of the Ashland and All-State divisions; H. L. Saunders, shop superintendent and master mechanic; and Russell Ward, assistant shop superintendent and chief electrician.

Pickup and return of equipment is handled by three company trailer trucks serving Ashland and the rebuilding plants at Beckley and Logan. In addition, a fleet of regularly scheduled trucks operates from the seven plants of the company in delivering replacement parts, supplies and equipment.

The Ashland location favors accessibility to Joy plants and to National Mine Service warehouses at Jenkins, Ky.; Beckley and Logan, W. Va.; and Indiana, Pa., and proximity of the Ashland plant to several major highways facilitates maintenance of the pickup and delivery schedule and quick procurement of any needed parts or materials. Although every effort is made to keep in stock every part or assembly required for replacement, it is necessary on occasion to call on other warehouses for a part needed to complete a job on schedule.

WHEN TO REBUILD

As a result of its experience, National Mine Service recommends a regular schedule of rebuilding on a tonnage or operating-time basis. Rebuilding on the basis of picking the

GOOD HIGHWAY and rail connections supplement location central to coal-producing areas.

REBUILDING SUPERVISORS—G. E. Sulter, H. L. Saunders and Russell Ward on the job.

Central Location . . . Mine-Experienced Management

CLOSE TO THE CENTER of coal production in the United States, the 6¼-acre plant concentrates principally on the rebuilding of loading machines, cutting machines, shuttle cars and continuous miners.

machine in worst condition by inspection tends to increase costs because the machines are used beyond economical limits, causing production delays and increasing rebuilding cost.

An example of regular scheduling is a northern West Virginia mine that had one 42D shuttle car rebuilt each month during 1953 and has adopted a similar schedule for 1954. A southern West Virginia company had twelve 32E cars rebuilt in the last half of 1953.

At Ashland, the plant is geared to the principal job of rebuilding all types of Joy equipment—loaders, shuttle cars, cutting machines and continuous miners. The rebuilding is authorized by the Joy Mfg. Co., and all replacement parts are genuine Joy parts. The equipment is rebuilt to Joy standards or, if altered at the customer's request, new specifications are furnished by Joy, which in turn provides a revised repair-parts catalog.

All replacement parts are returned to the customer with the rebuilt machine. Among other things, this permits the customer to check on the quality of the job. Some of these returned parts are in the border-line class—not good enough to put in a rebuilt unit but still usable for an emergency repair.

Rebuilding procedure also provides for modification and additions. For example, on special order, automatic lubrication has been installed on a number of loaders and shuttle cars. Permissibility is of course maintained in rebuilding and also there is an opportunity in some instances to rebuild a non-permissible machine to the specifications under which permissibility has been granted. In addition, it is possible for a customer to specify frame reinforcement or a completely new and heavier frame to meet unusually severe local conditions.

OPERATIONS SPECIALIZED

While the variety of machines is too great to permit a true production-line procedure, there are sufficient repetitive operations to permit specialization of equipment and labor. For example, there are separate departments for motors, controllers, wheel units, speed reducers, cleaning, painting, sheet-metal work and welding.

Applying full-load tests to electric motors is considered an important feature of the rebuilding service, and is done in the armature department. The motor is connected to a reduction gear on the output shaft, on which is arranged a screw-adjusted band brake. Meters on the attached panel indicate motor power input.

Controllers get the same thorough rebuilding job. All parts are dismantled and chemically cleaned. Rewiring is in accord with factory specifications, and the original color code is followed in rewiring all panels.

Every rebuilt machine is electrically and mechanically tested and adjusted before return to the user. The last operation before shipment is a high-voltage test. Machines with 250-v equipment are tested at 1,000 v, and those with 500-v equipment at 2,000 v. Shuttle cars are given RPM wheel tests to check uniform speed.

two of a kind?

they *look* alike . . . but the 20# line takes the *heavy* loads

there's a difference in carbides, too!

Like fishing lines, carbides for the mining industry can look alike — *and perform differently.* Kennametal Bits cut more places, drill greater footages because their hard, tough tips stay sharp longer, and take harder knocks than any other tungsten carbide.

This "plus" in performance is often the answer to tough cutting and drilling problems — and regularly increases efficiency in normal mining conditions.

Another important difference between Kennametal and ordinary tungsten carbides is this: Kennametal is made in grades, to provide maximum serviceability in various mining conditions. For example — Grade K12, with its exceptional shock-resistant ability, is used in cutter bits; roof drilling requires the extreme hardness and wear-resistance of Grade K9; while highly abrasive rock drilling calls for other grades.

Your Kennametal representative will gladly show you how the difference in carbides — and particularly the difference in Kennametal grades — can change production costs in *your mine.*

Look for the name of your Kennametal Representative in the yellow section of your phone book, or on the back of your Kennametal Price Book — or, write direct.

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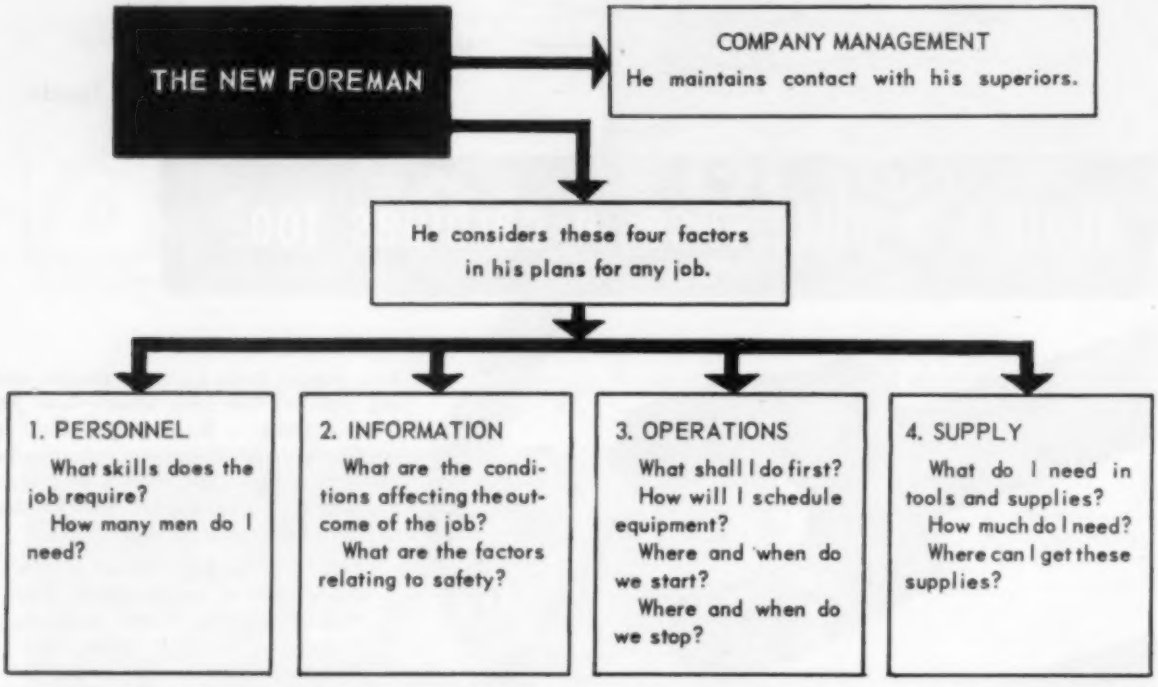
Foremen's Forum


THE NEW FOREMAN
COMPANY MANAGEMENT
He maintains contact with his superiors.
He considers these four factors in his plans for any job.
1. PERSONNEL
What skills does the job require?
How many men do I need?
2. INFORMATION
What are the conditions affecting the outcome of the job?
What are the factors relating to safety?
3. OPERATIONS
What shall I do first?
How will I schedule equipment?
Where and when do we start?
Where and when do we stop?
4. SUPPLY
What do I need in tools and supplies?
How much do I need?
Where can I get these supplies?

THE NEW FOREMAN, setting out to do a good job, keeps his channels of communication straight and seeks prior answers to all questions relating to the work he is about to supervise.

Pointers for the New Boss

No one eases himself into a supervisory position without suffering through some anxious moments during his early days on the job. Here are some hints to guide the new foreman as he settles down.

THE NEW BOSS lives in a shadowy world somewhere between the heavenly bliss of yesterday's life as a timberman or what have you and the hellish fury of tomorrow's life as a full-blown, unsheltered mine supervisor, relatively speaking. Existence as a boss is really quite tolerable, however, once the crossing over has been accomplished. Surviving the transition period is the big order.

Well, what is the newly-appointed mine supervisor supposed to do? What measures can he take himself to ease the transition?

Saying it briefly, he will have to provide a great deal of his own encouragement and most of his own restraint during this unsettled period. There are a number of things he should do and perhaps some things he should not do. There are some attitudes he should nurture and others he should subdue. Here's a parallel listing of some of these positives and negatives:

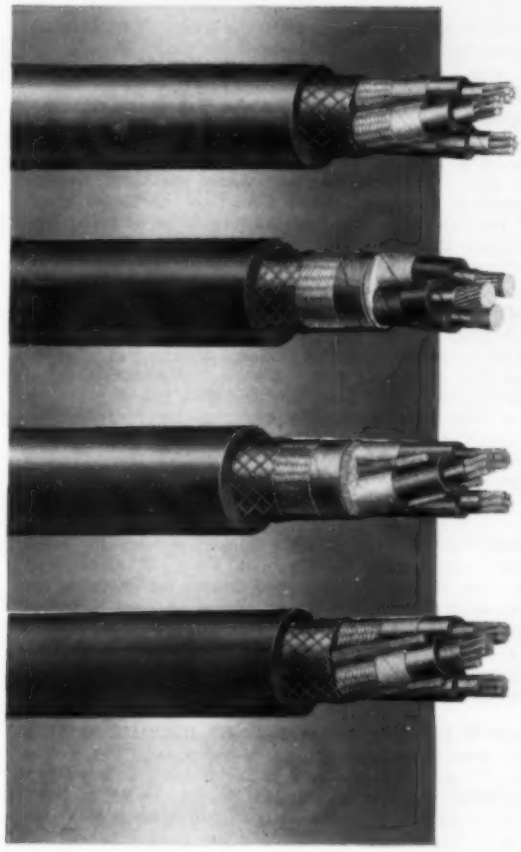
DO'S for the new boss . . .

1. PUT THE ACCENT ON SAFETY, right now in the very beginning of your supervisory career. In selecting you for a supervisory position, your superiors recognized your interest in safety as your foremost qualification for the job. Therefore, make up your mind now to observe the letter and spirit of all rules and laws governing mine safety. Your training in

. . . and some DON'TS

1. DON'T THROW YOUR WEIGHT AROUND. Your new title doesn't really make you a supervisor. You will have to prove your right to the title by (1) building a record of being right on the majority of your important decisions, (2) building a good safety record based upon your genuine concern for safety and (3) building a healthy production record on your ability to

Avoid costly "Downtime" with U. S. Royal Shielded Trailing Cables



U. S. Royal SH-A Cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S Uskorona-1 oil base compound, and covered with colored tapes and a braided coated copper shield. The conductors are then cabled and covered with a reinforced jacket of 60% black neoprene. The shielded braid over each insulated conductor eliminates corona cutting by static discharge through equalization of surface stresses.

SH-B cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound plus colored tapes. Conductors are then cabled with jute fillers, covered with a rubber-filled tape, a braided coated copper shield and reinforced 60% black neoprene jacket. The shielding braid protects the men handling the cable in the event of fault currents.

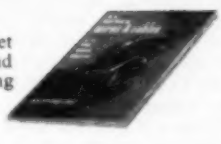
SH-C cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound and covered with a colored tape. The conductors are cabled with jute fillers and with the specified fabric-covered ground wires in the conductor interstices; then covered with a rubber-filled tape, braided coated copper shield and a reinforced 60% black neoprene jacket. This allows grounding of equipment and provides an adequate low-resistance path for short circuits, thus insuring circuit breaker operation. The grounded equipment provides protection to workmen under fault conditions.

SH-D cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound and covered with a colored tape and a braided coated copper shield. The conductors, together with fabric-covered grounding conductors, are cabled and covered with a reinforced black 60% neoprene jacket. The conductor shielding, when properly grounded, equalizes surface stresses and draws off all capacity charging currents, insuring safety in handling. An adequate low-resistance ground for the equipment is provided by the grounding conductors.

All shields and grounding conductors, when used, should be properly and thoroughly grounded.

The constant dragging, flexing, twisting and bruising encountered in heavy service will not bother U. S. Royal Shielded Cables. You'll find that U. S. Royal never runs you into "downtime"—it's the most dependable, efficient cable you've ever used.

United States Rubber Company is the only electrical wire and cable manufacturer to grow its own natural rubber, make its own synthetic rubber and its own plastics. This permits control of the production process—resulting in a quality product.



Send for illustrated booklet on U. S. Electrical Wires and Cables for the coal mining industry.

UNITED STATES RUBBER COMPANY
ELECTRICAL WIRE AND CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

US RUBBER

What to do . . .

safety may well be the most intensive preparation you have had for your new job, so capitalize on that training by making certain that everything you do can be squared with the safety rules. The safe way is the right way to do any job around the mines.

2. KNOW YOUR CHANNELS OF COMMUNICATION, both up and down, and observe them without fail. For example, if you have a bit of information the superintendent should have, be sure you pass is along through the mine foreman. And if you have a message for the coal-cutting crew, tell the cutter rather than the helper. Sometime later it might be possible to take a few liberties with these channels, although we do not advocate it even for the most experienced boss. For the new boss, such liberties only result in confusion and perhaps hard feelings.

3. ORGANIZE YOUR WORK step by step. Get yourself a little black book for this phase of your work. After you have a few years on the job, you will be able to remember a surprising amount of detail, but in the beginning you may forget some mighty important information if you don't cultivate the note-taking habit. The first thing you might do is to write a story of operations in your section patterned after some of the articles you read in your mining magazines. It will help you to learn a lot about your section in the shortest possible time. In supervising a job, follow the general outline in the illustration.

4. LEARN AS MUCH AS YOU CAN, as soon as possible, about the men in your crew and their skills, your machines and their characteristics, and the seam of coal you must recover. During World War II, the Army conducted an orientation course designed to provide the information needed by the men. The entire course was based upon these three points: Know your allies, know your weapons, know your enemy. The new boss must take steps to gain similar knowledge about his men his machines and the natural conditions in his section.

5. THINK LONG AND HARD before you make decisions. You may rest assured that as a supervisor you will be called upon to make decisions, sometimes in rapid-fire succession. Frankly speaking, this is the only reason for hiring supervisors. Wherever work is being done by a number of men there must be some one man who decides what to do and what not to do. As an experienced mining man, you will make proper decisions if you take time to think. You can be confident that you have enough knowledge to take the proper action when you must come to a decision. Your company knows you have this knowledge or you would not have been selected for your job. So breathe deeply to relieve your nervousness, take a good look at the problem facing you, then do your best to come to a decision you won't have to change.

6. GET OFF TO A GOOD START even on rainy Monday mornings. A grumpy supervisor can place his entire crew in the doldrums if he shows up at the mantrip with a long face. It is doubly important for the boss to leave his personal problems behind when he enters the property. He carries too much responsibility. Decide for yourself right now that this new job of yours must have your undivided attention, and that you must show up for work every day clear-headed, alert and reasonably enthusiastic.

7. CONCENTRATE ON YOUR JOB with all seriousness. Sometime later you may be able to get away with light banter with the men, but be sure you know your men first. You will gain their respect only through good supervision, not through good fellowship. Therefore, devote all your effort toward becoming a competent, dignified leader of mining men. You can be pleasant without striving to be a comedian right now.

8. SHOW BY YOUR ATTITUDE that you are in solid agreement with company policy, that you recognize the proper rights of employees and that you are going to be scrupulously honest in observing the labor-management codes in existence at your mine. Be honest with yourself in these matters. You are a member of management now. Have you been shocked by the sudden change? Don't let yourself become involved in criticism of company policy, and don't rant against these policies in front of the men who work for you. You lost your privilege to mount a soapbox when you accepted your new job.

What not to do . . .

direct the use and maintenance of machines, motivate men, control costs and promote efficiency. That leaves precious little time for throwing one's weight around.

2. DON'T SIGN ANYTHING until you fully understand what you are signing. Under mining laws your signature does carry weight, so be certain to use it wisely. Until you become familiar with standard forms, sign all documents as though they were the fire-boss' book. And your chalk-written initials in the working places you visit are just as sacred as your signature. They tell the world that you have been here, you have seen what is going on and to the best of your knowledge everything is all right. In witness thereof you have set your name and seal.

3. DON'T COMPETE WITH THE MEN in doing the jobs for which they are paid. You don't have to be the best workman in the section, you should be the best supervisor. If you see some project being done in a substandard manner, don't feel that you must take over the tools to get the work done right. Actually, this is an opportunity to provide some training, and training is one of your proper responsibilities. At any rate, we've never seen a boss who could compete on even terms with a 60-yr-old tracklayer in setting a frog. Don't ever try it. It can only end in embarrassment for you.

4. DON'T PERMIT ARGUMENTS about politics or other like matters to take up your valuable time in the mines. You may have strong opinions in these affairs and it may take quite a lot of effort to stay out of such discussions, but stay out you must. Otherwise, you may only be making antagonists for yourself at a time when you should be convincing others only of your ability to supervise the production of coal. You have enough to occupy your mind in the minute-by-minute duties of your job.

5. DON'T BE "THIN-SKINNED" when criticism is directed at you. Miners are great "leg pullers" and they may keep after you if you show that criticism disturbs you. For the first few days, they may give you some bad moments, but if you take it with a level head they will soon tire of the sport. Criticism from your superiors is necessary for your development. Don't resent it, learn from it. Keep this in mind: None of this criticism will be vicious. It is merely a phase through which every supervisor must pass, and if you take it gracefully it will soon pass.

6. DON'T PASS THE BUCK. This is perhaps the worst habit you could possibly develop. You are a responsible man. No one cares to hear all your good reasons for failing to get a job done, nor how someone else failed to keep their end of a bargain. The big hazard in this bad habit, however, is that you soon begin to believe your alibis yourself, thus limiting your ability to profit from your own mistakes and shortcomings.

7. DON'T EXPECT YOUR JOB TO BECOME EASIER once you have passed through this initial phase. The picture is constantly changing, and you will never see a time when a mine supervisor can lean back and let the job run itself. Right now the industry is changing more rapidly than it ever did. There is so much to be learned that the good boss will not hope for relaxation. This does not mean that you must operate in a constant sweat. It does mean that since you have chosen mine supervision as a career, you should be willing to keep abreast of what is going on in the industry.

8. DON'T BE DISCOURAGED BY THE SETBACKS which are bound to come to you, one right after another sometimes. There will be times when you can't seem to do anything right. The only remedy is to bear down harder. At times like these it pays to take time for a personal inventory. Most of the problems can be solved with your own talents and resources, and with the help you can have from your superiors for the asking.

for lower cost control of moderately **Corrosive** fluids

Fig. 2631-A Gate

JENKINS

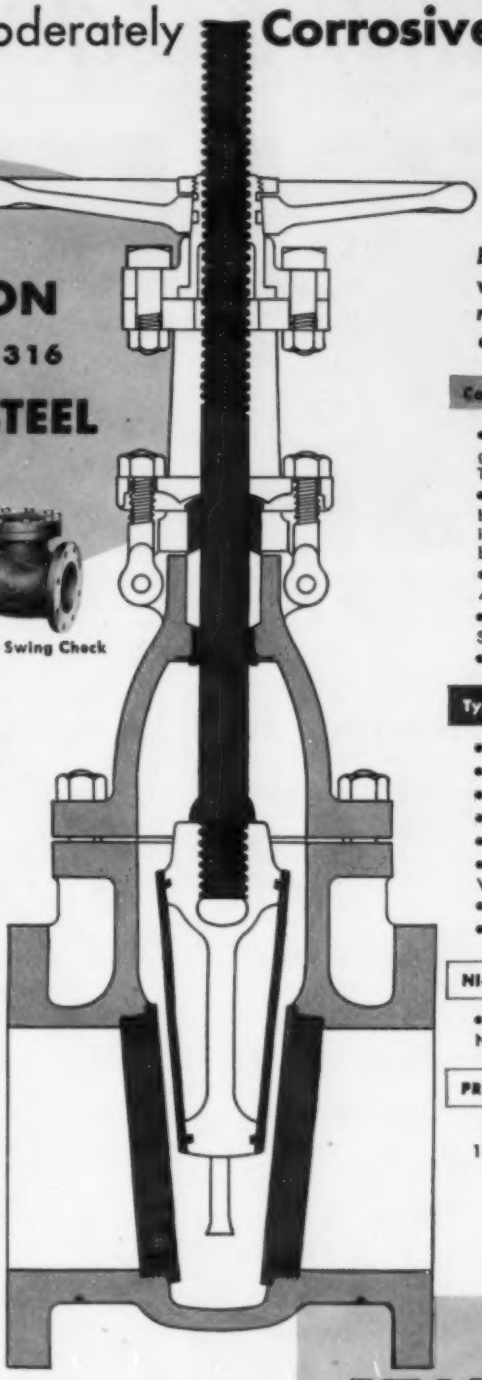
NICKEL IRON

Valves with Type 316

STAINLESS STEEL

Trim

Fig. 2624 Swing Check



Every part in contact with fluid is the right metal to block corrosion and beat wear.

Cast NICKEL IRON

- **BODIES** Heavy duty, dimensioned for greater resistance to wear and abuse. Through port design in Gate Valves.
- **BONNET** Rugged construction, like body. Swing-type gland bolts. Screwed-in back-seating bushing. Deep stuffing box.
- **YOKE** Integral with bonnet in 2″ to 4″ sizes.
- **WEDGE** In 10″ to 24″ sizes, with Stainless Steel Wedge Rings.
- **COVER** In Check Valve.

Type 316 STAINLESS STEEL

- SPINDLE
- GLAND
- BONNET BUSHING
- SPINDLE RING
- WEDGE PIN
- WEDGE RINGS Rolled into Nickel Iron Wedge in 10″ to 24″ sizes.
- SEAT RINGS
- DISC and HANGER in Check Valve

NI-RESIST Type No. 2

- WEDGE of I-beam structure is solid NI-RESIST in 2″ to 8″ sizes.

PRESSURE RATINGS

2″ to 12″—200 lbs. O.W.G.
14″ to 24″—150 lbs. O.W.G.

This combination provides corrosion resistance well above the moderate need in many processing services with an investment well below that for all-stainless steel valves.

Designed primarily for the chemical process industries, they are recommended for control of mildly corrosive liquids with minimum quantities of mineral acids, such as creosote in wood treatment, and many liquids carried in petroleum processing.

A major use is in pulp and paper processing, particularly in lines serving the digester, and in the chemical recovery cycle. Service records in lines carrying the valve-punishing "black liquor" give Jenkins Nickel Iron Valves top performance rating.

Jenkins *extra value* construction throughout. Get details — compare. See why they stretch your valve investment dollar — with longer service life, lower maintenance cost.

ALSO RECOMMENDED for fluids used in electroplating, photograph finishing, bleaching, dyeing, and heat treating of metals.

GET COMPLETE SPECIFICATIONS from your Jenkins Valve Distributor, or write: Jenkins Bros., 100 Park Ave., New York 17. Ask for Bulletin 118.

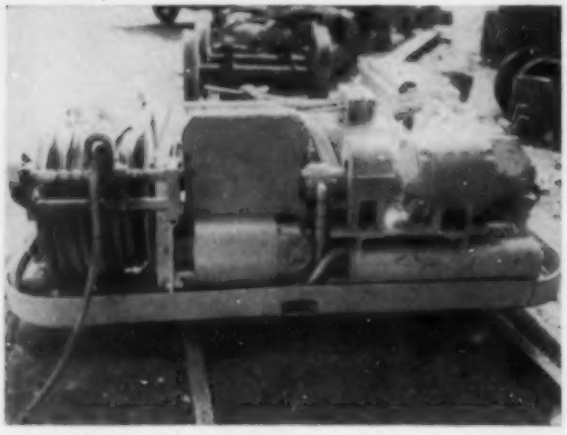
JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS

Jenkins Bros.

Operating Ideas



SPACE-SAVING INSTALLATION—Motor, pump and starter for operating hydraulic coal drill are mounted on the rear end of shortwall truck. The starter (center) is the same height as the cable reel. In right photo, Roy L. Gayhart, maintenance foreman, stands beside completed unit. The 24-gal oil tank is mounted above the crawler and the coal drill lies in the front end of the truck.

Space on Shortwall Truck for Hydraulic-Drill Pump

WITHOUT INCREASING the over-all height, width or length of the unit, equipment for powering a hydraulic coal drill was added to a Joy T2-6PE shortwall machine truck by the Boone County Coal Corp., Sharples, W. Va. Neither the original cable reel nor power take-off was disturbed.

The coal is relatively hard drilling, and by the adoption of hydraulic drilling the coal company expects to gain the advantages of lighter weight, safer operation, faster drilling and lower maintenance

The hydraulic-power unit, consisting of a 5-hp Westinghouse motor and a Schroeder hydraulic pump, is mounted on the right rear corner of the truck (left photo). The motor, rated at 1,750 rpm, 230 v, is a Type SK-254 with NEMA small frame. A contact starter, made with Westinghouse 30-C contactors, is placed between the hydraulic pump and cable reel. The oil tank, mounted above the right-hand crawler, is 38 in long, 14 in wide, 11¼ in high, and has a capacity of 24 gal.

Operating pressure is adjusted to 1,400 psi. The Schroeder hydraulic coal drill used with the unit operates at 1,200 to 1,400 rpm.

Portable Unit Provides Desk and First Aid Underground

PORTABILITY is the keynote of modern mining and that includes service facilities which have to be moved as each section is completed. The latest addition to portability in No. 5 mine of the West Virginia Coal & Coke Corp., Omar, W. Va., is a portable telephone station for sections mining 42-in coal by Joy 14-BU loaders, shuttle cars and elevators into mine cars.

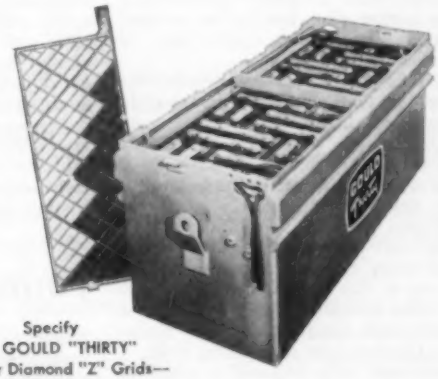
The unit was designed and built by A. J. Johnson, telephone electrician, who appears in the photograph. The station, which is skid-mounted and measures 38 in high, combines a first-aid station and desk. Under the platform there is a drawer for report forms and on the side near the top a clip for reports left for the next shift. Below that is a box of first-aid material and terminals, fuses and arrester for the telephone are on the back of the board. A lamp in the bottom of the box keeps the telephone dry. To pull the unit, a rope is attached to the front end of the runners. The boom operator and section foreman are the principal users of the phone.

COAL AGE publishes more "Operating Ideas" than any other mining magazine, but we're always glad to have MORE. So why not tell us about your successful ideas? We'll pay you $10 or more for each one, on publication. Write: The Editor, COAL AGE, 330 W. 42nd St., New York 36, N. Y.

TIRELESS ACTION

THANKS TO BATTERY POWER!

Tireless action—that's what your shuttle cars and locomotives have got to have to keep up with today's underground hauling needs. That's what you get when they're powered with new Gould "Thirty" Batteries with Diamond "Z" Grids. Extra reserve, extra performance, extra stamina are built into these batteries to keep your cars and locomotives in action all day long. There's no power like battery power—no battery power like *Gould* power.



Specify
THE GOULD "THIRTY"
with New Diamond "Z" Grids—
America's Finest
Mining Battery

GOULD *INDUSTRIAL BATTERIES*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

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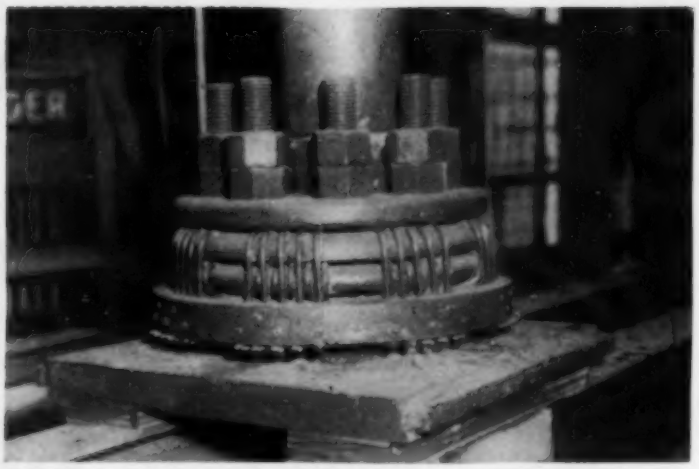


ARMOR WIRES of the 7-ton shaft cables are wrapped around steel plates which are bound together by 1¼-in bolts to provide shaft-collar support.

How Orient Installs a Power Cable in a Shaft

THE ARMORED POWER CABLE suspended in the 804-ft manshaft at Orient No. 3 mine, Chicago, Wilmington & Franklin Coal Co., Waltonville, Ill., weighs 7 tons. According to Ralph R. Richart, CW&F electrical engineer, here's how the supporting anchorage is designed and how such heavy cables are hung in the shaft, with due regard for the safety of the men doing the work and the electrical integrity of the finished installation.

The suspension clamp, designed and built at the mine, provides for anchoring the 42 galvanized armor wires (No. 4, BWG) in a three-pass ring-plate-type support. As shown in the photos, the cable clamp consists of four steel plates around which the armor wires are passed. The armor wires are passed through holes in the bottom plate and further secured by set screws bearing against each of the wires.

All four plates then are fastened together tightly through the use of eight 1¼-in bolts to provide the necessary support for the 7-ton load. The base upon which the ring-type clamp rests is made of insulating material to isolate the cable from the structural steel in the headframe.

The shaft section of the cable (804 ft) hangs from this one support; the remainder of the 1,000-ft run of cable is supported from the roof along an underground entry, terminating at the underground high-voltage distribution room.

Two shifts were required to make the installation. The end of the cable was hoisted 20 ft in the headframe to facilitate the installation of the clamp at right angles to the cable. The 10½-ton reel of cable, as shown, was suspended by a sling from a crane where it was free to rotate. Then the cable was lowered into the shaft in a loop outside the bunton line, passing over a rubber-lagged 54-in steel sheave.

A bulldozer fed the cable in 50-ft moves to the sheave, using large wooden clamping blocks bored to fit the 3.72-in diameter of the cable. When the loop was 50 ft below the collar of the shaft the cable clamp was lowered to its permanent position on two I-beams at the shaft collar.

Lowering operations were resumed, and soon the weight of the cable provided the moving force with the bulldozer serving only as a holdback. At the end of each 50-ft move the wood clamping block was chained to the head-frame steel while the 'dozer backed up to hitch onto another clamp to repeat the cycle.

After 800 ft of the cable had been lowered, the remaining 200 ft were unreeled in a straight line on the surface. The final phase involved attaching a 900-ft piece of 1⅛-in hoist rope, recently taken out of service, between the factory-made pulling loop at the end of the cable and the bulldozer stationed in a nearby field. With the bulldozer secured to the tailrope as a holdback, lowering operations were resumed until the loop reached the foot of the shaft and was rolled out to the end of the 1,000-ft cable. In these final operations the crane also was secured to the tailrope as a safety precaution.

FACTORY-MADE LOOP in armor wires at end of shaft cable permits safer handling during lowering.

The shaft cables are protected at the ends by air circuit breakers with interrupting capacities of 150,000 kva, and are provided with relays on the switchgear to guard against overcurrent, directional overcurrent and ground faults.

Formula Speeds Wire-Size Calculations

HERE'S A TIME SAVER for engineers, technicians and slide rule experts who often are required to calculate wire sizes in a hurry. The following formula, submitted by Carl P. Nachod, vice president, Nachod & U. S. Signal Co., Inc., Louisville, Ky., is set up for easy solution with a slide rule:

$$N = 37 - 10 \log \frac{DI}{V}$$

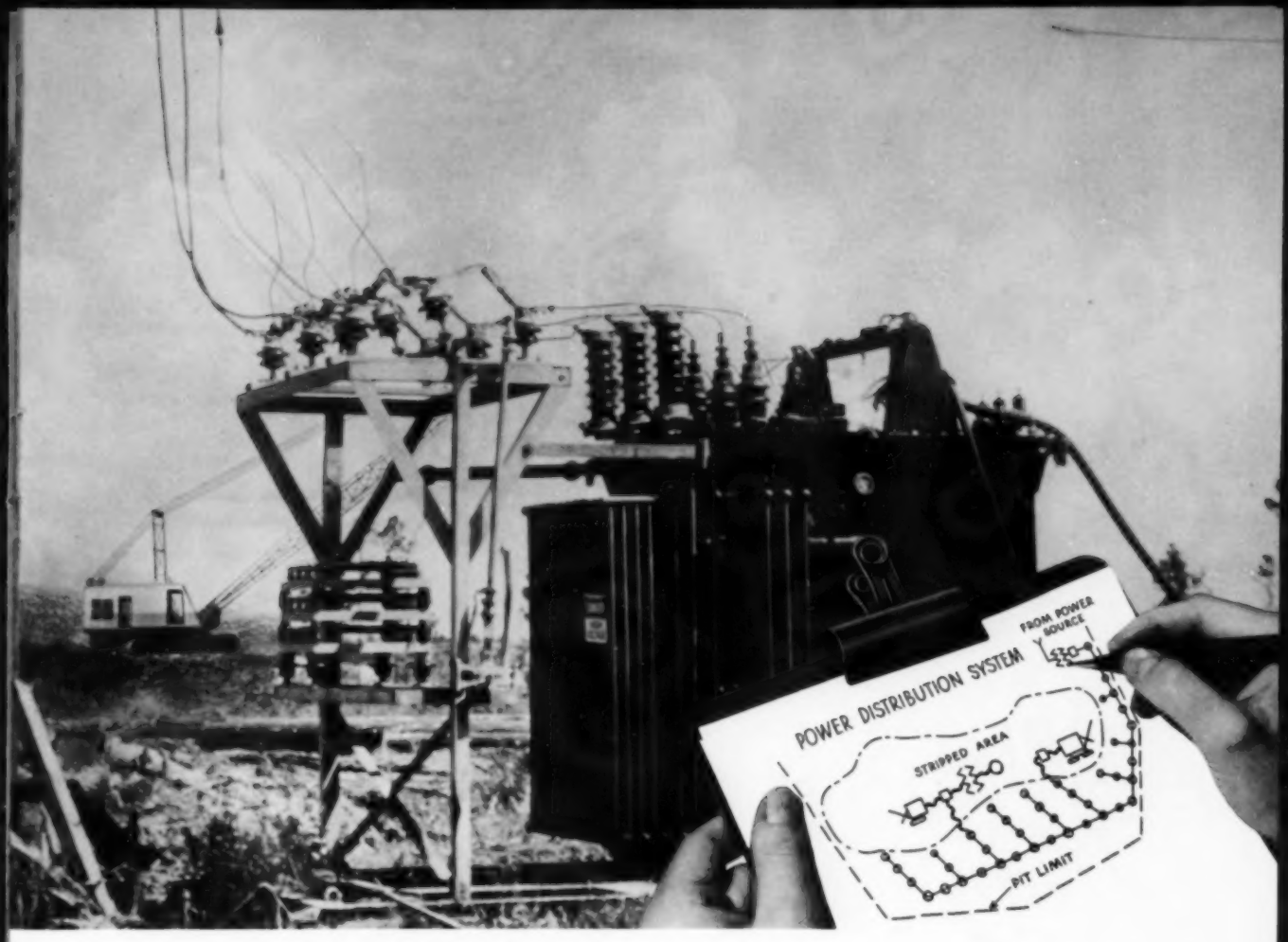
N is the size of wire to be found; D is the distance to the load, in feet; V is the permissible voltage drop for the amperes, I, flowing.

To try a sample calculation, assume D is 550 ft, V is 12 and I is 90 amp.

Set up the relation $\frac{DI}{V}$ on the slide rule, using the C and D scales. Your answer should be 413. Look at 413 on your log scale, read 0.616 and add the Characteristic 2. Substitute 2.616 in the formula and solve for N.

$N = 37 - 26.16$ or $N = 10.84$.

Therefore, use No. 11 wire.



How Westinghouse helps you outstrip tonnage records

. . . with dependable power distribution
. . . with coordinated electrical drives

Here's the heart of your plans to increase strip mine production this year . . . your electrical distribution system. Can it meet the demands you may place on it? By helping you plan electrically, your local Westinghouse engineer gives you added assurance of service continuity and lower operating costs.

Service continuity depends on applying the proper equipment to meet power demand as well as the demand in each load area. Westinghouse unit substations or CSP® transformers provide system protection while maintaining proper voltage in the load area. Compact, factory assembled, these skid-mounted units are solidly constructed to take rough handling. Lightweight Hipersil® transformer cores allow them to be moved more easily. Dividing the load among Westinghouse unit substations makes it easy to isolate any area of the operation without disrupting service. It has long-term advantages, too, in allowing easier expansion to meet increased power demands.

Lower operating costs result from system planning to bring higher voltage close to the load. Power transmission losses are held to the minimum. Operating efficiency of equipment is improved by better voltage regulation. Motors deliver full rating, and you get maximum power for each job.

Next page, *step up flow from strip mine to cleaning plant . . .*

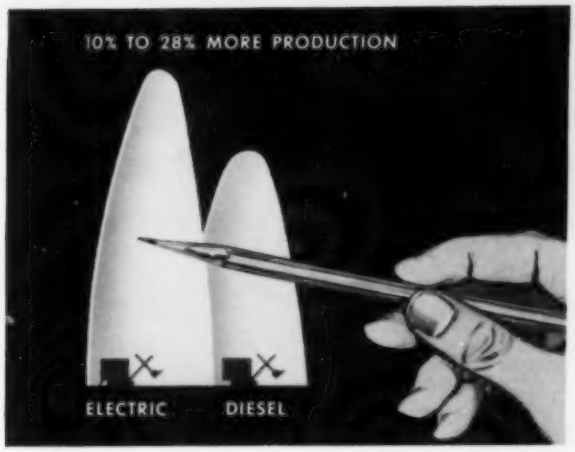
This Westinghouse-equipped walking dragline digs 130 ft. deep. Picks up a 32-ton load in one bite, dumps it 437 ft. away and returns . . . all in a 60-second cycle. Coordinated Westinghouse drives can help you get production like this, too.

Westinghouse skid-mounted switch house handles three outgoing feeder cables. It contains an oil circuit breaker, disconnect switches, overload and ground protective equipment and plug-type receptacles.

Rototrol increases machine efficiency. Operator doesn't have to worry about damaging the equipment when working at full power. The control's simplicity makes servicing very easy.

Heavy-duty d-c motors for shovels and draglines are specially constructed with low inertia armatures for rapidly reversing service. Improved commutation allows these motors to handle heavy peak loads quickly.

New Life-Line "A" motors provide dependable power for auxiliaries. Four-way sealed, pre-lubricated bearing assembly eliminates the need for costly greasing. Dust, dirt, and moisture are sealed out—grease sealed in. There is no danger of over or under greasing.



Move greater tonnage with coordinated electric drives

By coordinating the design of motors, control and generators, built specifically for shovel and dragline service, Westinghouse helps you keep tonnage moving at a high rate.

Smooth, controlled operation increases production

For example, the d-c adjustable voltage control with Rototrol® regulator is the brain of shovel or dragline operation. When fast action is necessary, as during the swing, Rototrol "forces" the electric drive. The responsive action is quick, fluid and smooth. This prevents shocks to your equipment and speeds up the operation. Rototrol decreases shock loads on the machinery. During the hoist, swing, and drag or crowd operation, the motors will stall out rather than force the bucket (or dipper) and cables beyond the limits of safe operation.

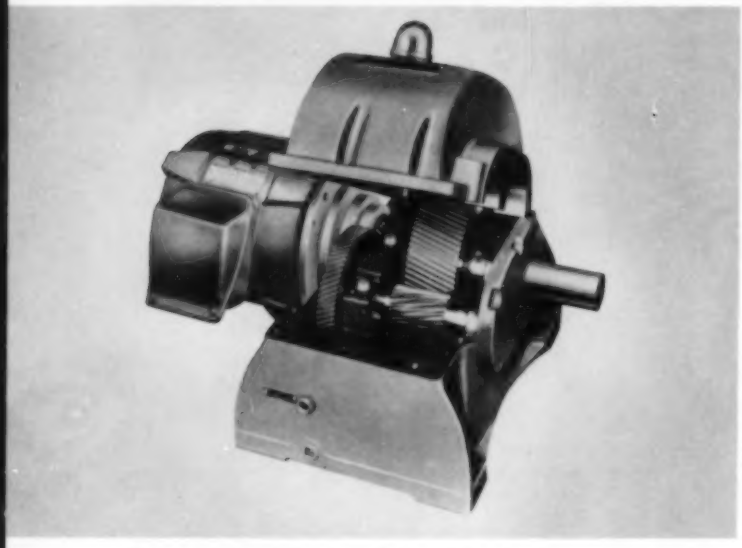
Dependable operation maintains continuous flow

Increased protection given Life-Line® "A" motors makes them well suited to auxiliary drives on shovels and draglines. New Bondar conductor insulation offers unusual resistance to heat caused by temporary overloads. Bondite stator insulation includes silicone particles homogenized with the varnish to provide protection against moisture, dust and dirt. Cast-iron drip-proof and TEFC enclosures stand up to knocks, jarring and rough handling.

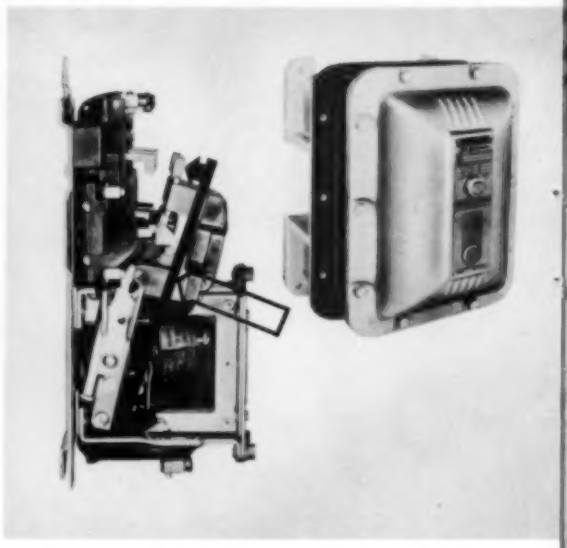
YOU CAN BE SURE...IF IT'S Westinghouse

Next page, *how to maintain peak operation*

How Westinghouse engineering helps you continue peak operation



Fast inspection of Westinghouse Life-Line gearmotors results from horizontally split gear case that can be unbolted and removed without draining oil, dismantling, or disconnecting the load. Fewer moving parts simplify inspection and servicing.



Simplified design of the Life-Linestarter has only one moving part with a seesaw-balanced, clapper action that will not stick or jam. It is self-aligning . . . not subject to false operation from vibration or shock.

Product design for rugged use

The durability of Westinghouse-designed equipment helps you maintain record-breaking performance. By coordinating motors, generators, gearmotors and control for shovels, draglines and auxiliary mining equipment, your Westinghouse engineer provides integrated, reliable performance. All units are designed to work together for highest efficiency and ease of operation.

Field Service to speed inspection and repair

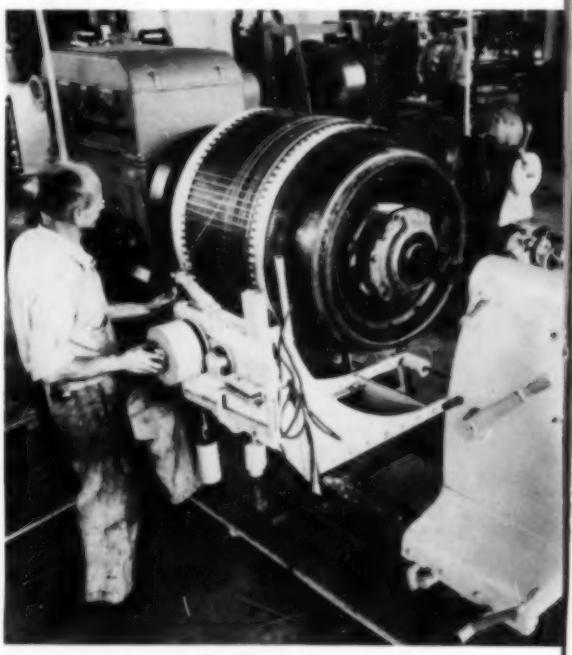
Westinghouse Field Service Engineers operate from a nationwide network of 56 field offices. They give all new Westinghouse-equipped shovels and draglines at least one free inspection the first year of operation, and are always available in case of need.

Thirty-eight strategically located Westinghouse Manufacturing and Repair Plants are available to give you fast service on all types of electrical apparatus. Any complete rebuilding job receives the same one-year guarantee given to new equipment.

For further details

Your Westinghouse representative will be glad to answer any questions you may have and get you a copy of any of the literature listed below; or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

(a) Power Distribution and Protection for Open-Pit Mines and Quarries B-5447
(b) New Life-Line "A" Motor B-6154
(c) Life-Line Gearmotors B-5645
(d) Automatic Operations Start with Westinghouse Controls B-5882
(e) Complete Industrial Control B-6051
(f) Equipment for Shovels and Draglines B-5476



Fast accurate repairs by Westinghouse service engineers are handled in the field for equipment that cannot be moved or at 38 strategically located Manufacturing and Repair Plants.

YOU CAN BE SURE...IF IT'S Westinghouse

MP3029

LOOK what they're saying about

ANACONDA SECURITYFLEX* SHOVEL CABLE

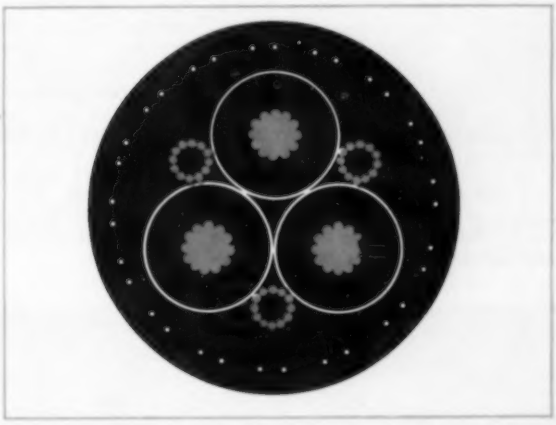
GENERAL MANAGER:
"This cable saves us money . . . there are far fewer breaks . . . and far fewer shorts from ground wires."

MINE ENGINEER:
"No matter how we run it over rocks, it holds up well. It must be the jacket. It wears like iron."

MINE FOREMAN:
"Securityflex sure is flexible . . . mighty easy to handle, too . . . the toughest cable we've ever used."

MINE SUPERINTENDENT:
"Our men can splice Securityflex easily and in less time. That saves us on down-time."

These are the things Anaconda salesmen hear daily about Securityflex Type SH-D Shovel Cable. Why not see *your* Anaconda Sales Office or Distributor for full information about this cable? *Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.* *Trade Mark



AND THE REASON USERS CAN SAY THIS IS BECAUSE:

- New **BUTYL INSULATION** provides better resistance to heat, moisture and damage by compression
- New **NEOPRENE JACKET** is tougher and more abrasion resistant
- **RUBBER CORES** cushion the ground wires . . . help prevent broken wires
- New **COPPER-COTTON SHIELD** is easier to splice

the right cable for the job

ANACONDA®

WIRE AND CABLE

FOR SAFE CROSSING of highway and railroad tracks, installation (left photo) includes: high-level trolley wire (A) highway signals (B) and control box (C) housing interlocked contactors to light signals and turn DC power into trolley wire. In operation (right), motorman notes from the signal (D) that no railroad cars are coming, pushing a button (E) which lights the highway signals (B) and also energizes the nip hanging on the pole (F). On the other side he pushes another button that turns off the highway signals and kills the power on the high wire.

High-Level Trolley Wire Handles Supply-Track Crossing

MINE SUPPLY TRACKS crossing highways and railroad tracks usually present difficulties from the standpoint of time and safety. If the mine track is on a grade, as is usually the case, the problem of handling power is a complicated one. The trolley wire cannot be placed high enough to clear vehicles and trains if it still is to be contacted by a trolley pole. Attempting to coast mine locomotives or other equipment across without power sometimes requires a risky approach speed and also involves the possibility of stalling on the crossing.

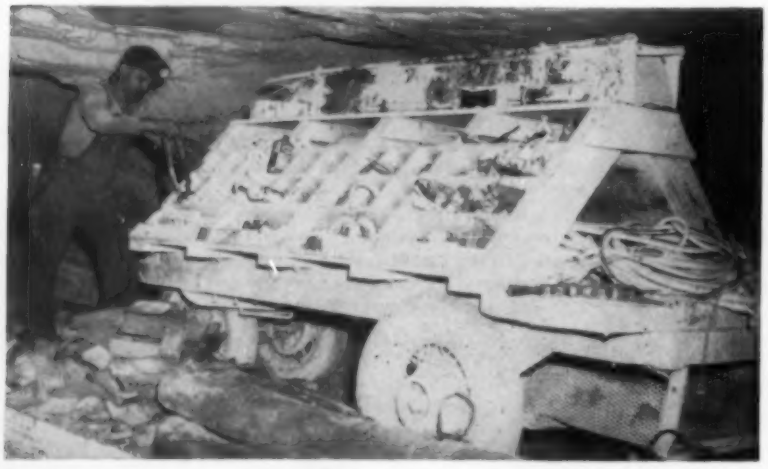
At Sharples, W. Va., the Boone County Coal Corp. recently improved its supply-track crossing over railroad tracks serving the empty side of the preparation plant and an adjacent crossing over a paved highway—a total crossing distance of 127 ft.

For that distance, a trolley wire was installed at a height 30 ft from the ground. Operating along this wire is a trolley or carriage from which is suspended a drop cable terminated with a nip. To power a locomotive across the railroad tracks and highway, the drop cable is nipped to the harp.

Normally, the high-level trolley wire and nip are dead. When a supply locomotive is to cross, the motorman pushes a button mounted on a pole beside the track, which illuminates the highway signals and energizes the nip. This interlock makes sure that power to cross is not available until the highway signals are in operation. At the far end of the crossing, the motorman pushes another button which darkens the highway signals and kills the high-level trolley wire, drop cable and nip.

Another set of signals to warn the motorman that railroad cars are approaching or are already blocking the mine supply track was installed several years before this latest improvement. The original signals are maintained and are set and cleared by railroad men or car shifters.

TROLLEY WIRE 30 ft from the ground suspends a drop cable that is nipped to the locomotive harp.



Shop-Made Wagon Saves Supply Time

REMODELING old material and putting it to good use is one of the talents of the staff at the Majestic No. 14 mine of the Peabody Coal Co., Du Quoin, Ill. Shop maintenance men there designed and built this portable supply wagon from an old Ford chassis which had been classified as scrap. The wagon is stored near the workings and has proved to be a big saver of time and effort by making necessary emergency repair equipment immediately available.

This versatile **HT4** *Shovel*
HELPS FACE-UP OVER 100 MINES

PROSPECTING and facing up new mine openings—this Caterpillar-built machine-of-many-uses has taken more than 100 new mines in stride. In addition, it loads up to 500 tons of coal per day on stripping operations *without "shooting"*—a big factor in cutting mining costs. It is shown at the Pocahontas No. 3 seam of Peel Chestnut Coal Co., Inc., Pageton, W. Va.

The Cat* HT4 Shovel can also clean up and bulldoze. Its heavy frame and bucket control arms, built of steels bought to special Caterpillar requirements, stand up to equipment-busting work around rock. The HT4 is a fast worker: it can simultaneously raise and dump its 1¼-yard bucket, has accurate hydraulic controls and excellent operator visibility. It's compact and easy to maneuver in tight places.

Also cutting costs is the Caterpillar HT4 Shovel's ability to deliver full power for only pennies per hour on No. 2 furnace oil. The HT4 illustrated uses less than 11 gallons of this money-saving fuel in a 7¼-hour working day. You save by using inexpensive fuel, and less of it. You also save on maintenance costs and down time, because the Caterpillar-built fuel injection system is *foul-free* all through the power range—idling, lugging and full throttle.

Engine, tractor and shovel are a balanced unit that can make extra profits for you by staying on the job and out of the repair shop. Your nearby Caterpillar Dealer—who backs his sales with fast service and genuine Cat parts—will gladly demonstrate, *on the job*, the shovel that will do most work for you at lowest cost. Call him today.

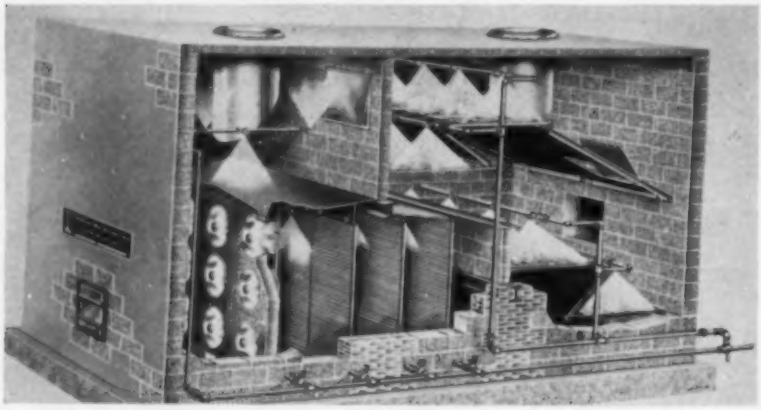
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

Equipment News

Liquid-Type Gas Scrubber in Low-Cost Structure (1)



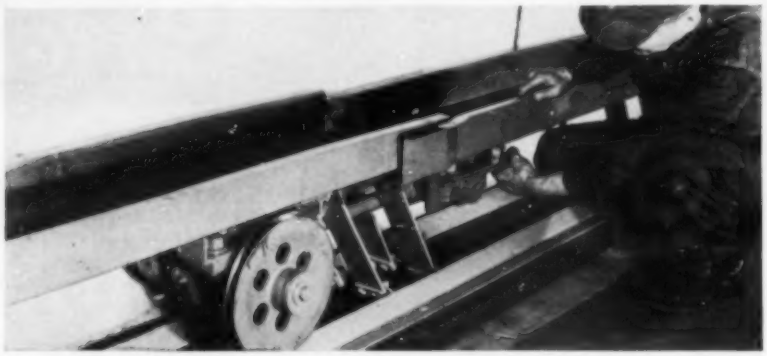
A new dust precipitator, the Johnson-March Type-H liquid precipitator and multiple-action scrubber, employs a 750-to-1 mixture of water and Compound M in removing large volumes of dust entrained in the gases from cyclones, rotary driers, kilns, and so on. Available in eight sizes designed for handling high-temperature gases in volumes from 8,000 to 60,000 cfm, the new unit requires about 2½ gpm at 40 to 50 psi per 1,000 cfm of capacity. The scrubber may be installed in a concrete- or cinder-block housing as a permanent set-up, or in a fabricated steel housing where portability is desired.

Precipitation of the solids in the stream of gases is accomplished by the use of expansion chambers where larger or wetted particles may drop out, wet impinger plates to trap smaller-size particles which are then washed out of the stream of gases, venturi throats to control the velocity of the stream and direct it onto the impinger plates, a change in direction of flow of the stream to precipitate still more of the solids and, finally, a series of precipitator elements under liquid sprays preceding the discharge stack.

Additional impinger plates may be included and the sprays and precipitator elements may be adjusted in providing the most efficient and economical operating conditions. The precipitated sludge from the bottom of the unit may be directed to a settling pond or tank where the liquid may be clarified for reuse. The use of Compound M hastens the clarification process, the maker states, and it also facilitates the precipitation of hard-to-wet dusts. Throats and impinger plates are made of cast iron, impinger panels of carbon steel or special alloys, and precipitator elements of heavy-gage angle iron and stainless steel. Circle No. 1 on postage-free card facing p 124 for full details from Johnson-March Corp., Philadelphia, Pa.

New Mine Jack Twice As Fast (2)

Its new highspeed mine timber jack is said by the maker, Templeton, Kenly & Co., to be twice as fast as conventional screw types and provide safer, more economical timbering in mines. Faster operation is credited to a crank and bevel-gear arrangement that rotates the screw, and the jack is said to have all the safety advantages of the screw type. Rotating heads permit its use flush against a wall or rib and various heads are available to handle all types of timbers. The jack also is useful in renewing mine-locomotive brasses when the locomotive is over a pit. The jack has a capacity of 6 tons and is available in five models with minimum heights from 3½ ft and maximum heights to 9½ ft. Full details from Templeton, Kenly & Co., Broadview, Ill.



Smaller Vibrator Offers Improved Efficiency (3)

A new and smaller vibrating conveyor featuring greater simplicity, reduced power requirements and improved efficiency has been announced by Hewitt-Robins, Inc., Stamford, Conn. The spring-mounted unit is designed to convey coal and other materials at 38 fpm and specially coated or stainless-steel pans are available for handling extremely corrosive or abrasive materials. Simplified design permits the new unit to be set up or moved in less than an hour and the only maintenance required is lubrication of three standard cartridge-type bearings, it is said. Standard pans are 4 in deep, available in widths of 8, 12 or 18 in, with or without top covers. The single-drive 1-hp model is available in lengths ranging from 20 to 100 ft and transfer sections can be used to couple one or more units in tandem. The heavy-duty drive provides almost twice the handling capacity and transfer length of other small models, the company reports.

Circle No. 3 on the postage-free card facing p 124 for full details from Hewitt-Robins.

"LOW-SLUNG"

FOR CLOSE-QUARTER WORK

Photo courtesy of Kennametal, Inc.

Here's proof of the RBD-30's ability to work in low seams. This unit was equipped with a 9¼" hitch bit to drill away a 20" core of bony.

Photo Courtesy of Kennametal, Inc.

Then without repositioning, the RBD-30 drilled a 42" bolt hole inside the hitch hole and set the expansion bolt in the solid roof.

The compact Chicago Pneumatic RBD-30 Mobile Roof Bolting Unit's 28" over-all height makes it ideal for operating in low coal seams. And it's equally as efficient in high seams as well! You can complete an entire cycle, from drilling hole to setting expansion bolt without repositioning, in 3 minutes flat. And where hole depth is less than 36", installation can be made in 1½ minutes!

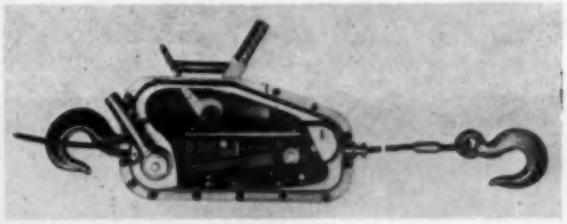
One rugged motor drives both auger and bolt setter — a telescopic chuck permits 10" auger adjustment to quickly conform to roof irregularities. Slip clutches prevent feed motor from stalling and protect drill and nut setting motor. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

1-Yd Shovel Broadens Use Possibilities (4)

Designed to bridge the gap between the application and portability advantages of machines up to ¾-yd and the output advantages of larger, heavier units, its new heavy-duty LS-98 offers a new concept in the application of a 1-yd shovel crane, according to the Link-Belt Speeder Corp., Cedar Rapids, Iowa. Completely new from track to boom tip, the LS-98 is capable of high productivity on large jobs or small scattered operations, and since it weighs 58,000 lb as a shovel can be transported over most state highways on a flatbed trailer without major dismantling and re-assembly expense and the lost time usually necessary with moving larger shovels, the company points out. An important feature cited by the maker is the exclusive "Speed-o-Matic" power hydraulic control which is said to offer up to 25% more productivity over manually controlled machines of the same class. To maintain its faster working cycles without undue wear, the LS-98 features a design combining adequate power, ground-hugging stability and extra strength of all working components. Bulletin 2530 from the company.



Hand-Powered Unit for Pulling and Hoisting (5)

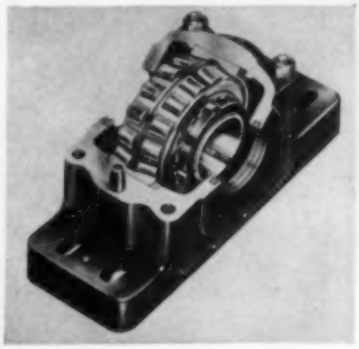
The Tirfor Griphoist, a lightweight, portable hoisting and pulling unit made and used abroad in mines and other industries for some time, now is available in the United States. Weighing 42 lb and supplied with 60 ft of cable, the one-man unit has a single-line capacity of 3,300 lb, and with multiplying sheaves up to 10 tons. In operation, the cable passes through the machine where it is alternately gripped and pulled by two pairs of steel jaws operated by a telescopic hand lever requiring a maximum of 77-lb effort. Positive pressure is exerted on the load at all times and speed with full load is 10 fpm in either direction, with load controllable within 0.001 in. Since the cable travels through the machine and does not reel or spool on a drum, cable of any length can be used. The Griphoist can be used in close quarters and in any position, vertically, horizontally or diagonally. It currently sells for $149.50. Details available from: east of the Mississippi, Princeton Griphoist, Inc., 32 George St., Boston 19, Mass.; west, Griphoist, Inc., 544 Market St., San Francisco 4, Calif.; Canada, J. A. Gosselin & Co., Ltd., Drummondville, Quebec, Can.

BLASTING UNIT GENERATES OWN CURRENT (6)

Maximum safety and reliable performance are features of a new portable blasting machine said by the maker to be the first condenser-discharge-type unit utilizing a high-voltage DC generator directly connected to charge the condensers. Eliminating the need for batteries, the machine is completely self-contained and always ready for use. A specially wound permanent-magnet DC generator is hand-cranked at moderate speed and, although the actuating button can be depressed while the operator is building up the charge, the firing circuit cannot be closed until the condensers are delivering a full 450 v. A built-in voltmeter provides an accurate check on the charge. The unit has a capacity to fire up to 50 caps in parallel and up to 1,200 properly connected in a single shot and there is no possibility of a residual charge, the company says. The machine is weatherproof and weighs 30 lb. Details from the Atlas Powder Co., Wilmington, Del., or from the Fidelity Instrument Corp., York, Pa., developer of the unit.

DRIVES FASTENERS IN 1-IN STEEL PLATE (7)

Its new "Super-Power Jobmaster" is the first powder-actuated tool designed to drive heavy shank fasteners successfully into structural steel plate up to 1 in thick and into hardest concrete, according to the Ramset Div., Olin Industries, Inc., Cleveland, Ohio. The tool weighs less than 8 lb, is 15 in long, operates with either one or two hands and sets pins or studs ⅜ in in thread or head diameter at a rate of one or more a minute. It can use any of 19 Ramset-designed fasteners. Details from the company.



ROLLER BEARINGS FOR SEVERE SERVICE (8)

New heavy-duty roller bearings, especially designed for severe operating conditions in steel mills, mines and foundries, have been added to the Link-Belt line. The "mill bearings" incorporate precision Link-Belt self-aligning roller bearings in a particularly sturdy steel pillow block housing designed to withstand heavy loads and severe impacts. The Link-Belt roller bearing is said to align itself instantly without impairing the full load-carrying capacity, even when subjected to minor shaft deflections and normal inaccuracies of mounting, and no auxiliary parts are needed, thus simplifying maintenance. Link-Belt "mill bearings," Series LPK6800F, are made in shaft sizes from 2 7/16 to 6 15/16 in in diameter. Details in Book 2565, Link-Belt Co., Chicago 1.

B.F.Goodrich

Tires roll from pit to plant on rock-strewn roads, defy cuts!

THE roads that connect the mining pits with the Charleson Iron Mining Company's plant at Virginia, Minn., are covered with chunks of abrasive rock and stone. Trucks roll over these roads 24 hours a day, 7 days a week, carrying 17-ton payloads.

Tire mortality could be high. This company uses B. F. Goodrich Universal tires, reports they wear longer, pull better, defy rock snags and cuts. Wedge-shaped cleats pull in either direction, protect against dangerous side-slip, give outstanding traction compared to other rock-type tires.

Under the Universal tread is the patented B. F. Goodrich nylon shock shield. Layers of strong nylon cords stretch together to absorb shocks. You save 4 ways: (1) more hours of service (2) more recappable tires and more hours of service per recap (3) increased bruise resistance (4) less danger of tread separation.

TONS OF ROCK crash onto B. F. Goodrich Universal tires that will carry the load up steep hauling roads to the plant. BFG makes a complete line of off-the-road tires.

CHARLESON'S TIRES are 95% B. F. Goodrich, preferred because the specially-compounded tread defies rock bruises. Universal tires are available in All-Nylon or rayon construction.

You pay no more

You get all these advantages, yet you pay nothing extra for the exclusive BFG nylon shock shield. Let your B. F. Goodrich retailer show you how Universal tires can save you money. His address is listed under Tires in the Yellow Pages of your phone book. Or write *The B. F. Goodrich Company, Tire & Equipment Division, Akron 18, Ohio.*

Specify B. F. Goodrich tires when ordering new equipment

CAT* power since '43–

"GOOD PERFORMANCE ALL THE WAY"

That's what Mike Mazzara says of his Caterpillar equipment in coal-stripping operations for Mazzara Coal Co., McKees Rocks, Pa. He owns six Cat D13000 Engines and seven Caterpillar track-type Tractors. "Best on the market," he states. "We've had nothing but good performance out of all our Cat equipment all the way."

One of his Caterpillar D13000s powers the Lorain 75-D with 1¼-yard shovel, shown here stripping roof coal to get at the good bottom coal underneath. Ground will be backfilled after the coal is taken out.

This Caterpillar D13000 has been on the job since 1943. It moves an average of 150 to 200 tons per hour—about 45 tons for every gallon of low-cost fuel! All Caterpillar Engines can deliver full and *foul-free* power on money-saving No. 2 furnace oil, thanks to their special Caterpillar-built fuel injection systems.

In addition to fuel savings, Caterpillar Diesel Engines can cut your costs in many other ways. "Hi-Electro" hardened crankshaft journals, long-lived aluminum alloy pistons and bearings, really *effective* oil and air filtration—these are just a few features of rugged, reliable Caterpillar Engines that give you *long work life, minimum down time,* with *little maintenance.* And when you need skilled service and genuine factory parts, you can count on your Caterpillar Dealer.

There are Caterpillar Engines and Electric Sets to 500 HP and 315 KW. Your Caterpillar Dealer will help you pick the unit that suits your needs to a "T." When you repower, or order new equipment, specify Cat power. Leading manufacturers of excavators and other mining equipment can supply it in their machines.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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FREE BULLETINS AVAILABLE

(9) COAL CRUSHERS—Bulletin 4010, "Crushers for Coal Mines and Coal-Cleaning Plants," provides detailed application and design information on the various types of crushers made by Pennsylvania Crusher for the coal industry. The 12-p booklet covers operation and use of the Bradford Breaker, ring-type, one-way and reversible hammermill, single-roll and Kue-Ken jaw crushers, reversible impactor and the Bradmill. Offered by the Pennsylvania Crusher Co., Philadelphia 7.

(10) MINE VENTILATION—New 20-p Catalog 54 describes the products of American Brattice Cloth Corp., Warsaw 2, Ind. A 12-p section gives facts and figures on its Mine-Vent flexible ventilation tubing for secondary mine and tunnel ventilation, and describes equipment for suspending and coupling it. Other sections describe ABC brattice cloth, ABC powder bags, and ABC inflatable brattices. Catalog available from American Brattice Cloth.

(11) CHAIN DRIVES—New 88-p Silent Chain Book No. 2424, containing detailed engineering data, is offered by Link-Belt Co., Chicago 1, Ill., as one of the most comprehensive books developed on the subject. In addition to detailed data on the design operating features of Link-Belt silent chain, the book has a 16-p section listing pre-engineered stock drives for normal requirements. Another section of 22 p outlines the procedure for selecting completely engineered drives, with table of service factors, rating tables, and chain length and center distance computations. Other sections cover drive components, accessories, installation, maintenance and lubrication procedures.

(12) LUBRICATION—12-p Booklet 22-240-A, "Five Plans for Better Plant Lubrication," emphasizes five methods of lubricant handling designed to reduce lubrication headaches and costs. It also points out seven ways in which good plant lubrication can cut production costs in machine down time, machine repair and service, waste of lubricant, less man-hours, less expensive housekeeping and elimination of safety hazards. Available from the Alemite Div., Stewart-Warner Corp., Chicago 14, Ill.

(13) METHANE INDICATOR—National Mine Service Co., Beckley, W. Va., offers bulletin describing operation of the Riken methane indicator, said to permit accurate readings to be made in seconds to 0.1% on a scale ranging from 0.0 to 0.8% and to compare in accuracy with highly technical laboratory equipment for analysis of gas samples. No special training or skill is necessary to operate it.

(14) BELTING—New 28-p catalog covers the Boston line of rotocured transmission conveyor and elevator belting, with specifications, type of construction and recommended use for each. A section is also devoted to the formulas and rules used in estimating horsepower requirements for Boston belting. Offered by the Belting Dept., Boston Woven Hose & Rubber Co., Box 1071, Boston 3, Mass.

(15) DRAGLINE BUCKET—Catalog RL-154 describes the new Page "RL" Class light-weight automatic dragline bucket said by the maker to efficiently dig and economically load clay, earth, sand or gravel. Catalog available from Page Engineering Co., Clearing Post Office, Chicago 38.

(16) WATER TREATMENT—Hardinge Co., Inc., York, Pa., offers Bulletin AH-442 describing its line of water, sewage and waste-treating equipment. Installations of Hardinge circular clarifiers are illustrated and various applications are discussed, along with several typical flow sheets and a brief description of auxiliary apparatus, such as, digestors and flocculating equipment.

(17) ELECTRICAL MODERNIZATION—16-p Westinghouse Booklet B-6133, "Compete or Collapse," points out that while plant modernization is the key to successful competition, the first step in any modernization program must be the efficient distribution of electrical power. The booklet describes the principal elements of a modern electrical system and shows how it can increase output, lower operating costs, reduce down-time and maintenance and increase safety. Available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30.

(18) ULTRASONIC TESTING—Use of ultrasonic waves for non-destructive testing of materials and products, preventive maintenance of machinery in shop or field, and application of the technique to existing quality-control systems are described in Bulletin 50-105, published by Sperry Products, Inc., Danbury, Conn. It explains how the Sperry Reflectoscope transforms electrical pulses into ultrasonic vibrations and transmits them into material through a search unit. A portion of the vibrations, when reflected by any defect, reveals on a screen both the existence and the location of the structural discontinuity. Accuracy in locating defects is estimated as within 2% and maximum capacity of the unit approaches 30 ft of aluminum or steel, it is said. The portable, easily operated unit may be either purchased or leased.

(19) DUSTPROOFING COAL—Brief CoB-2, "Dustproofing Coal with Calcium Chloride," contains a basic chart showing the quantity of calcium chloride needed in relation to the size and condition of the coal to be treated, and the recommended solution and procedures for application. A list of necessary equipment is also included. Offered by Calcium Chloride Institute, Washington 6, D. C.

(20) V-BELTS—Catalog 2170 offered by The B. F. Goodrich Industrial Products Div., Akron, Ohio, provides detailed data on BFG patented Grommet belts in standard and high-capacity constructions, said by the maker to last 20 to 50% longer, stretch less, carry greater loads, yet cost no more than other V-belts. New horsepower rating tables permit the design or redesign of V-belt drives at reduced cost.

(21) GEAR LUBRICANTS—Technical Letter X-417 available from the Sales Technical Service Dept., Standard Oil Co. (Ind.), Chicago 80, provides details of development, properties and use of the company's line of Stanogear compounds. The new line of extreme-pressure industrial gear lubricants was developed to improve performance of such products, to meet severe-duty requirements and to provide a uniform line suitable for a variety of applications.

(22) WEED CONTROL—Low-cost weed and grass control achieved with du Pont "Telvar" W weed killer, its uses and

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (May 1954)

1	6	11	16	21	26	31	36	41	46	51	56	61	66	71	76
2	7	12	17	22	27	32	37	42	47	52	57	62	67	72	77
3	8	13	18	23	28	33	38	43	48	53	58	63	68	73	78
4	9	14	19	24	29	34	39	44	49	54	59	64	69	74	79
5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80

In addition, please send me data on these OTHER products advertised in this issue (give name and page number) .....

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Company .....

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results, are described in Booklet A6644 available from the du Pont Public Relations Dept., Wilmington 98, Del. "Telvar" W is the new name for CMU weed killer in commercial use for over 2 yr, and records of successful use show that one application has controlled vegetation for an entire season or longer, the company reports.

(23-24) TRUCKS-SCRAPERS—Catalogs covering the Euclid 17-yd bottom-dump trucks and the Euclid Twin-Power scrapers, with specifications, design features and typical performance figures, are offered by the Euclid Div., General Motors Corp., Cleveland 17, Ohio. Circle 23 on the postage-free card for Catalog 251 describing the 17-yd bottom-dump unit, hauling up to 25½ yd heaped at speeds up to 28.2 mph. Circle 24 for Catalog 551 on the Twin-Power scraper, capable of handling up to 24 yd, heaped, with speeds up to 31 mph.

(25) BEARINGS—New 300-p Catalog 54 has been issued by Bearings, Inc., 3634 Euclid Ave., Cleveland, Ohio, distributor of 48 lines of bearings and bearing specialties. The catalog, which gives complete information on every size and type of bearing distributed by the company, is being made available to buyers and shopmen who have a continuing need for this type of information. Bearings, Inc., also issues, from time to time, catalogs on specific types of bearings and bearing specialties.

(26) RUBBER HOSE of various types, belting and other industrial rubber products are described in 24-p catalog available from the Carlyle Rubber Co., New York 17. Included are suggested applications, specifications and prices for each product.

(27) STRIP MINE ROADS—Effective use of calcium chloride for consolidating road materials to provide compact, moist and dustless surfaces is discussed in Brief CoB-4, "Calcium Chloride for Strip Mine Haulage Roads." It includes data on maintenance and construction of new haulage roads, and a chart showing quantities of flake calcium chloride for various road widths. Available from Calcium Chloride Institute, Washington 6, D. C.

(28-29) ELECTRICAL EQUIPMENT—Bulletin 2655, Crouse-Hinds' 1954 edition of its "Condulets For Hazardous Locations" series, contains a table listing the commercial uses of hazardous substances and their flash points and ignition temperatures; Articles 500 and 510 of the 1953 National Electrical Code; and detailed descriptions of explosion-proof and dusttight electrical equipment conforming to these Code Articles. The 82-p booklet is available to qualified personnel, from Crouse-Hinds Co., Syracuse, N. Y., by circling 28 on the postage-free card. Bulletin 2660, "Electrical Equipment Design for Hazardous Locations," is the latest of an annually revised series of 16-p bulletins distributed by Crouse-Hinds that explains why electrical equipment for hazardous locations is designed and built as it is. It is available by circling 29 on the card.

Movies Available for Group Showings

(42) U. S. Steel Corp., Pittsburgh 30, offers its 1954 catalog describing the various industrial motion pictures it makes available on a free loan basis for showing to all recognized groups.

(43) Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., offers individual booklets describing a new series of three 35-mm sound slidefilms on V-belt drives, available for group showings. The films cover basic engineering for V-belt drives; installation and maintenance; and checking drive characteristics.

(44) Alemite Div., Stewart Warner Corp., Chicago 14, has a new 15-min 35-mm sound-slide film in full color on lubrication problems that takes the viewer into a typical plant to show the right and wrong way to handle lubricants from "barrel to bearing" and presents five plans for proper lubricant handling.

(30) POWER SHOVEL—American Hoist & Derrick Co., St. Paul 1, Minn., offers Catalog 700-G-24 on its new 1½-yd shovel 35 ton crane, said by the maker to provide various exclusive features that save both time and money on the job. Application photos and general specifications are included.

(31) AC MOTOR FRAMES—To dispel possible confusion over old and new mounting dimensions, Reliance Electric & Engineering Co., Cleveland 10, Ohio, offers a "Compar-A-Frame" chart to aid engineers and designers in quickly comparing the old and new NEMA AC frame- assignment standards. The single-page chart on light-weight cardboard shows, at a glance, comparative dimensions of open-type and fan-cooled-type polyphase induction motors, with comparison of frame sizes according to horsepower and speed, etc.

(32) PUMPS—Bulletin W-318-S27 describes Worthington Type UNB two-stage centrifugal pumps designed for working pressures up to 400 psi and capacities up to 1,300 gpm; available in fittings and castings of various metals and readily adaptable to mine and other services where moderate heads and high capacities are involved. Offered by Worthington Corp., Harrison, N. J.

(33) PANELBOARDS—Planning circuit-breaker panelboards is discussed in a new 16-p Westinghouse Booklet B-8098, which covers the advantages of De-ion circuit breakers and of the dead-front breaker panel, outlines characteristics of panelboards and presents a complete line of equipment. From Westinghouse Electric Corp., Box 2099, Pittsburgh 30.

(34) TRACTOR APPLICATIONS—"Power Equipment for Your Profit Zone" is a new 16-p catalog on industrial equipment offered by the Tractor & Implement Div., Ford Motor Co., Birmingham, Mich. It shows varied job applications and features the complete list of Dearborn equipment, including loaders, angle dozers, blades, cranes, snow plows, plus specialized tools such as post-hole diggers, tractor-mounted saw, etc.

(35) CORROSION-RESISTANT PIPE—Folders from the Michigan Pipe Co., Bay City, Mich., describe construction and use of its fabricated piping, tubing and fittings for water, corrosive liquids, slurries, etc. Discussed are wood-lined steel pipe, Saran rubber-lined pipe, wood-stave pipe and various alloy-steel types.

(36) SHUTTLE-CAR HAULWAYS—Use of calcium chloride for treatment of shuttle-car haulage roads to eliminate

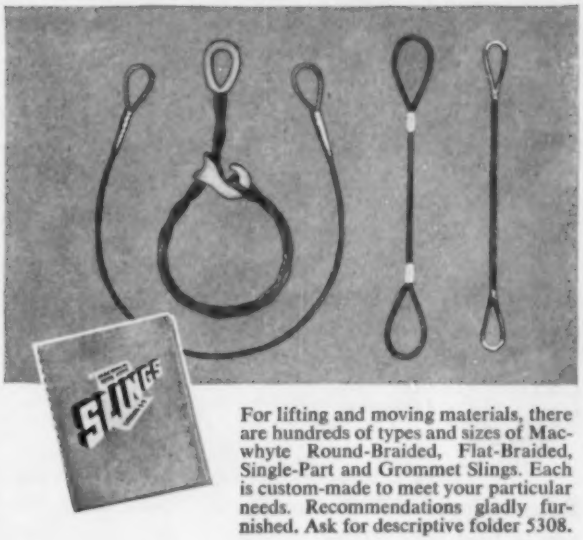
Continued on p 198

Get long, low-cost service with

MACWHYTE

WIRE ROPE • SLINGS • ASSEMBLIES

In Macwhyte's complete line there are a thousand and one sizes and types of wire rope. Thoroughly lubricated and PREformed—they are engineered to give long, low-cost service on your equipment. Recommendations gladly furnished—ask for Catalog G-16.



For lifting and moving materials, there are hundreds of types and sizes of Macwhyte Round-Braided, Flat-Braided, Single-Part and Grommet Slings. Each is custom-made to meet your particular needs. Recommendations gladly furnished. Ask for descriptive folder 5308.

Macwhyte Safe-Lock Wire Rope Assemblies are made to order in length, strength and flexibility desired. Terminals are permanently attached to one or both ends. Recommendations gladly furnished. Ask for Catalog 5201.

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Manufacturers of Internally Lubricated PREformed Wire Rope—Round-Braided and Flat-Braided Wire Rope Slings—Stainless Steel Wire Rope—Monel Metal Wire Rope—Aircraft Cable and Swaged Fittings—Safe-Lock Wire Rope Assemblies.

Mill Depots: New York, Pittsburgh, Chicago, St. Paul, Fort Worth, Portland, Seattle, San Francisco, Los Angeles. Distributors throughout U.S.A.

105258

"BAKER FINGERTIP CONTROL is the best I ever had my hands on," says Allen Knight, Bulldozer Operator of Indianapolis, Ind., "and I've run 'em all. I can feel where the blade is . . . I get better control of my work."

Talk to operators of Baker-equipped A-C Tractors . . . you'll find they prefer the easy, natural operation of *Baker* Fingertip Control. With the exclusive Baker control-valve system, they can *hold* the blade in any position—without settle or "suck in." Result is *better work*—done with *less fatigue.*

Also important for control sensitivity and accurate blade response is Baker-designed *Direct-Linkage.*

With excess linkage *eliminated,* Baker Blades are *rigid* and *rugged*—with *fewer moving parts that work better and last longer.*

Your Baker, A-C Dealer will be glad to demonstrate!

THE BAKER MANUFACTURING COMPANY • SPRINGFIELD, ILLINOIS

dust and provide compact, smooth, dust-free roads is covered in Brief CoB-3, "Dust Control on Shuttle-Car Roadways with Calcium Chloride." It presents general instructions and contains recommended quantities of calcium chloride required to control dust under various conditions. From Calcium Chloride Institute, Washington 6, D. C.

(37) FLOW REGULATOR—A new self-contained flow-regulating device for clean, strained liquids is described and illustrated in Catalog 10-F-70 from the Fischer & Porter Co., Hatboro, Pa. The device is said to maintain a constant flow rate by energy derived from the flow stream itself without external power supply, to be unaffected by position and may be equipped with a diaphragm motor valve for remote setting of control point.

(38) FIRST AID KITS—New first-aid catalog offered by the E. D. Bullard Co., San Francisco 3, Calif., contains complete information and photographs of 16 different types and styles of Bullard "Safety Green" first-aid kits and lists the 70 different unit first-aid packs to permit picking any combination desired with ease. All first-aid kits are available with any assortment of these unit packs to fit the accident patterns of the specific industry, and when purchased in quantities of 50 or more Bullard Kits may be ordered with the company insignia imprinted at no extra cost.

(39) STEEL FLOORING—16-p catalog, offered by Flash-Stone Co., Inc., Philadelphia 40, describes Ancor rolled-steel flooring plates, their uses in armoring heavy-duty industrial concrete floors and the design characteristics said to prevent buckling, curling, or cracking and to eliminate slipperiness and noise. In-use photographs show Ancor plates permanently interlocked in a 1½-in concrete imbedment layer for various heavy industrial applications.

(40) PROTECTIVE COATINGS—Bulletin outlines the protective qualities of neoprene sprayed coatings and sheet linings in applications affected by sunlight, heat, abrasion, oil, cold and various chemicals, and includes a table on organic chemicals for which neoprene-lined tanks and piping can be recomended. Bulletin offered by Protective Coatings Div., Metalweld, Inc., Philadelphia.

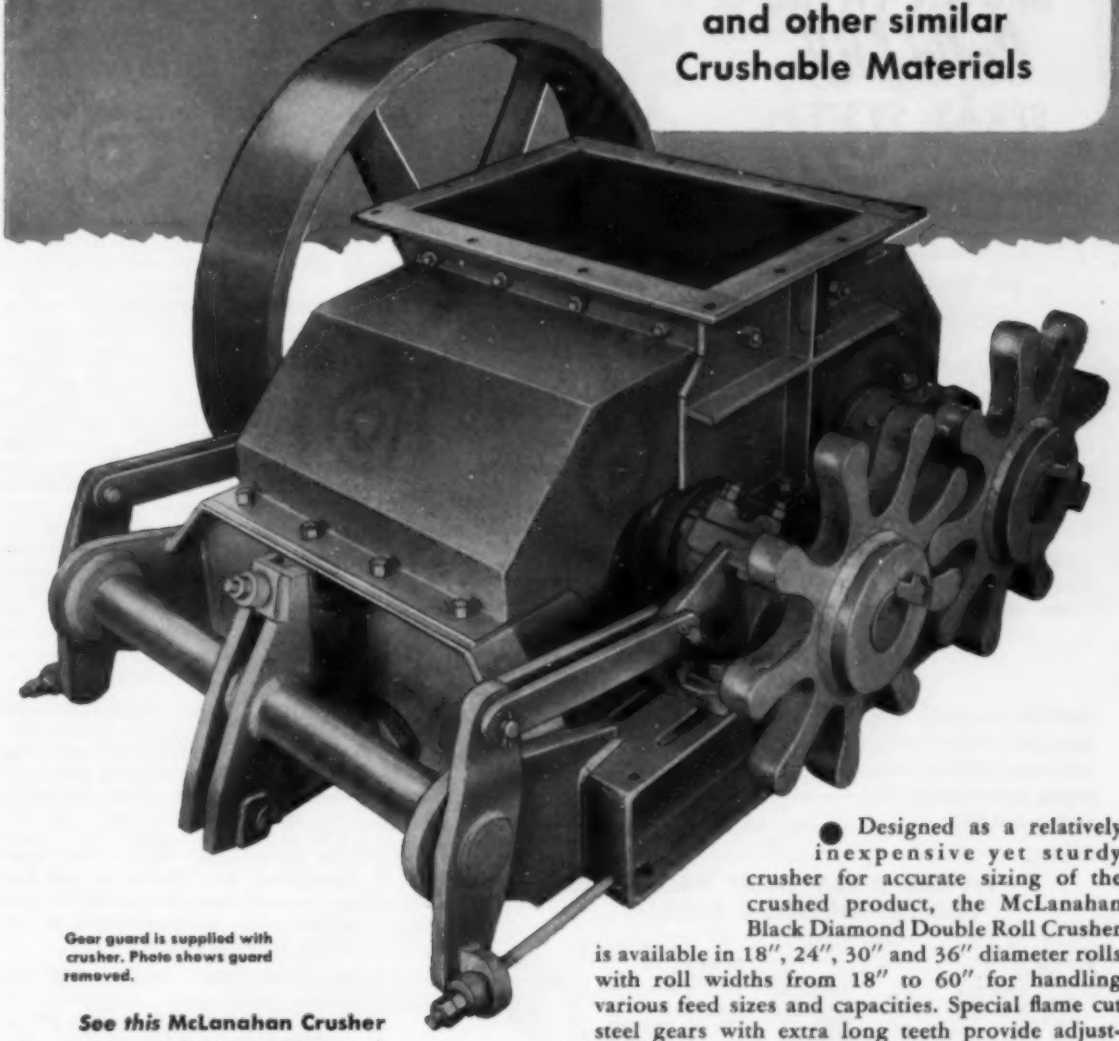
(41) BUILDING MAINTENANCE — Folder discusses use of Stonhard products to solve dangerous and unsightly floor conditions, patch or overlay concrete areas, harden concrete surfaces and eliminate concrete dusting, prevent water-seepage and seal roof leaks and rejuvenate dried-out roof areas. Available from Stonhard Co., Philadelphia 23.

(45) EMERGENCY ELECTRIC POWER —Bulletin L-411 describes features of the Homelite lightweight gasoline-powered generators designed to supply emergency electric power when storms, fires, floods or accidents disrupt normal power supply. It explains the various functions and uses of the units for industry, homes, institutions, etc., with specifications, electric output and prices of five models. From Homelite Corp., Port Chester, N. Y.

The McLANAHAN Black Diamond Double Roll Crusher

A Low Cost Sturdy Crusher

for
Reduction of Coal—
Lime—Cinders
and other similar
Crushable Materials



Gear guard is supplied with crusher. Photo shows guard removed.

● Designed as a relatively inexpensive yet sturdy crusher for accurate sizing of the crushed product, the McLanahan Black Diamond Double Roll Crusher is available in 18″, 24″, 30″ and 36″ diameter rolls with roll widths from 18″ to 60″ for handling various feed sizes and capacities. Special flame cut steel gears with extra long teeth provide adjustments in crusher opening up to 3½″.

Write today for complete data.

***See this* McLanahan Crusher**
on display at the
BLUEFIELD COAL SHOW
May 26, 27 and 28!

McLANAHAN & STONE CORPORATION
Pit, Mine and Quarry Equipment Headquarters Since 1835
Hollidaysburg, Pennsylvania

Dependable Products: Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apron Feeders, Roll Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Steel Log Washers, Screw Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Sprockets, Sheaves, Rollers, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.

Dust Control Economy
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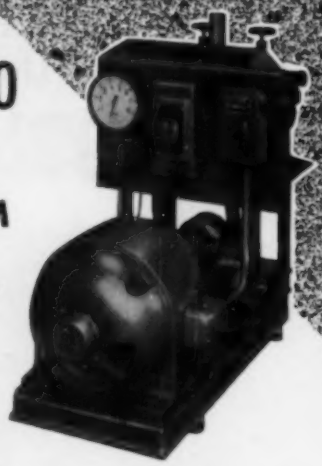
BROWN-FAYRO *Cold Oil* SPRAY SYSTEM

Atomizes "cold oil" by high pressure! Eliminates oil pre-heating costs!



Brown-Fayro "cold oil" Spray System answers the need for economically and permanently eliminating the dust problem. Coal surfaces are sealed . . . dust particles are gathered into oil-bonded pellets by this system which features a high pressure pump and impact type nozzles. Additional costs of a "hot oil" system are eliminated!

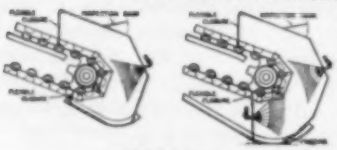
Designed to keep conditions uniform at the spray points, the Brown-Fayro system assures an even distribution of properly atomized oil over the material surfaces. For efficient, low cost dust control, specify Brown-Fayro "cold oil" Spray Systems!

CAPACITIES

CAPACITIES: Brown-Fayro Spray System pump unit when working at a pressure of 400 p.s.i. gauge, handling oil of a viscosity of 100 sec. Saybolt at 100°F.

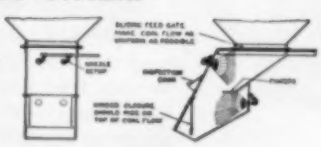
HP	POWER	R.P.M.	G.P.H.
3	25 Cy. AC	710	425
3	60 Cy. AC	870	520
5	60 Cy. AC	1160	695
5	25 Cy. AC	1435	860
7½	60 Cy. AC	1750	1050

TYPICAL SPRAY POINT ENCLOSURES FOR BROWN-FAYRO SYSTEMS



FOR BOOMS

When spraying at the end of a boom, a plow is used on one or both sides to concentrate the coal and avoid waste of oil. Spray can be directed either at top or at top and bottom.



FOR CHUTES

Spray fog should be directed at a point where the coal is falling or agitated. At this point, chute should be carefully enclosed in light gauge steel to prevent waste of oil.

Write today for complete information.

THE BROWN-FAYRO COMPANY

JOHNSTOWN, PA.

Equipment Shorts You'll Want to Check

(50) ROOF BIT—A new cemented-carbide-tipped prong-type roof-bolting bit for drilling starter holes has been developed by Carboloy Dept., General Electric Co., Detroit 32, Mich. The new APT-24 drill bit was designed for fast, straight hole-cutting in shale and strata softer than sandstone and also may be used to cut 1⅛-in expansion anchor holes.

(51) SAMPLING HOPPER—The newly designed American sampling hopper is a quick, accurate way to obtain a portion of the sample taken from a carload of coal and provides a uniform and representative sample of 5%, 10%, 15% or 20% of the coal fed into the mill, with the sample percentage quickly and accurately controlled by a simple-to-operate lever and calibrated quadrant, the maker says. The sample quantity emerges from one spout, the balance of the crushed sample from another, and there is no loss of moisture content in sample. Details from the American Pulverizer Co., St. Louis, Mo.

(52) DC WELDER—New General Electric 400-amp, three-phase DC rectifier-type welder with a 60% duty cycle, designated as G-E Type WR40A, can be equipped to operate on a two-phase power and has a current welding range of 70 to 500 amp. It can be utilized with a variety of electrode sizes for repair, maintenance and construction work. According to the company, the selenium-rectifier welder makes it easy for operators to achieve current adjustments by means of a stepless current control, and the unit also features quiet operation and simplified maintenance. Details from General Electric Co., Schenectady 5, N. Y.

(53) DIESEL FUEL INJECTORS—The Detroit Diesel Engine Div., General Motors, Detroit 28, Mich., has announced several changes contributing to longer life and increased operating efficiency in GM unit fuel injectors used in its line of Series 71 diesel engines. New engines have the improved "High Valve" injectors as they leave the factory and parts kits are available to incorporate the same improvements in injectors now in use. Details from the company.

(54) HYDRAULIC JACK KIT—New "Super Maintenance Assortment" of Blackhawk hydraulic "Porto-Power" equipment designed for industrial maintenance and construction work offers the latest in remotely-controlled hydraulic jacks and attachments for pulling gears, moving machinery and other maintenance jobs, the maker says. Providing a hydraulic pump, four rams from 4- to 20-ton capacity and 41 selected attachments, the kit conserves manpower and eliminates makeshift devices that endanger personnel and machinery, it is said. Details from Blackhawk Mfg. Co., Milwaukee 1, Wis.

(55) DOZER CONTROL—New medium-

WHY ROEBLING MINING MACHINE CABLES GIVE MORE FOR YOUR MONEY

ANY WAY you look at it, Roebling Roeprene Mining Machine Cables are today's best buy. The ground wire in these cables is made of flat, braided copper so that they have *extra* stretch and flexibility. Then, the neutral is covered with braided cotton which cushions and greatly reduces abrasive action between the copper and the insulation.

And to make sure that all components of the cables are held firmly in place, Roebling employs an additional process and "lead-mold" cures the Roeprene jackets. This curing method also produces a very tough, long-wearing jacket with outstanding resistance to water, acids, alkalis and grease.

Roebling Roeprene Mining Machine Cables are approved by the Pennsylvania Bureau of Mines Approval P-111, and comply with the requirements of the U. S. Bureau of Mines for flame-resistance. They are continuously mold marked for positive identification.

For top efficiency and savings, order Roebling Roeprene Mining Machine Cables from your mining distributor. John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

A subsidiary of The Colorado Fuel and Iron Corporation

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ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST & 5 PITTSBURGH ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • ROCHESTER, 1 FI[illegible] ST. • SAN FRANCISCO, 1740 17th ST • SEATTLE, 900 1ST AVE S. • ST. LOUIS, 3001 DELMAR BLVD • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

CF&I

JAR ROEBLING

...ride a "JEEP"

The Lee-Norse TJ1 Mine Jeep gets you there safely! Here's the best answer for speedier underground transportation to and from working faces and emergency areas for mine superintendents, engineers, inspectors and maintenance personnel. A versatile performer the Lee-Norse Jeep can be used to pull man-trip cars, fire-fighting equipment and can be quickly placed in service as an ambulance. Detailed data available on request. Write now!

...ride a "SCOOTER"

No reason for mechanics, pumpers, fire bosses and other maintenance personnel to lose valuable time hitch-hiking when there is a Lee-Norse Scooter at hand. Weighing approximately 1000 lbs., the Scooter is popularly priced and its low-operating cost fits into every mine budget. The Scooter has a 48" wheelbase, is 9' in overall length and is available in all track gauges from 36" to 48". Where time is a factor the Lee-Norse Scooter is a "must". Send today for complete information and prices.

Lee-Norse Company
CHARLEROI, PA.

duty rear-mounted Gar Wood Model 261 power-control unit is patterned after the field-tested heavy-duty Model 281 cable-control unit and offers similar exclusive features for fast, accurate control and smooth, positive operation, the maker says. It is designed for dependable, economical dozer or scraper work with tractors between 40 and 130 hp. The absence of jerking eliminates excessive strain on the cable, lengthens cable life, and eliminates operator fatigue, it is said. Details from Allis-Chalmers tractor dealers or Gar Wood Industries, Mattoon Div., Wayne, Mich.

(56) AIR VALVE COUPLING—"Quick-As-Wink" valve coupling assures a tight swivel seal, locked safety connection, quick easy disconnection and complete and safe control of the air line, at whatever point it is installed between the compressor and air-operated device, the maker says. The valve couplings are approved by safety authorities, the company reports, and are available in ¼- to ¾-in sizes with hose, or male or female pipe threads, for use with air to 250 psi. More details from C. B. Hunt & Son, Inc., Salem, Ohio.

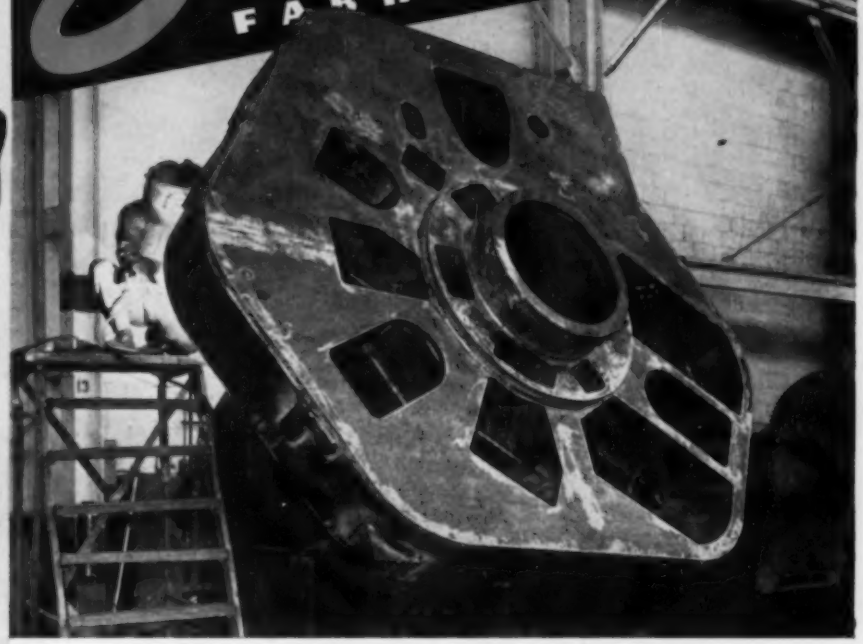
(57) HYDRAULIC PUMP—New high-pressure electric hydraulic-pump package, called the Manco Series H Hi-Thrust pump, is capable of delivering 2.04 gpm at 8,800 psi in intermittent operation and up to 4.5 gpm at 6,200 psi. Available with 2-, 3- or 5-hp, 220/440 v, 3-phase, 60-cycle motors, the units come as complete integral power packages ready for operation. Bulletin from Manco Mfg. Co., Bradley, Ill.

(58) ELECTRICAL CONTACTS made from copper graphite by powder-metallurgy processes are now offered by Gibson Electric Co., Pittsburgh 21, for use when high conductivity, non-sticking properties and economy are great factors. Called Gilsiloy UC-5 and UC-7, these new powder-metal contacts are said by the maker to be an improvement over copper-graphite contacts made by impregnating graphite with copper and to be capable of handling heavy currents without contact sticking. Gibson Electric furnishes complete contact assemblies or will braze the contacts to supports provided by the customer. Details from Gibson.

(59) FEEDER CABLE—New Flamenol Type UF underground feeder cable announced by General Electric's Construction Materials Div., Bridgeport 2, Conn., is suitable for underground wiring around homes, in light industrial areas, storage yards, parking lots, etc., and is easy to handle and install because of its light weight. Single-conductor G-E Flamenol underground feeder cable is available in Sizes No. 14 through No. 4 AWG, and two- and three-conductor cables in Sizes No. 14, 12 and 10 AWG.

(60) CUTTING TORCH—New cutting attachments and a new jet-type mixer greatly extend the cutting, welding and heating range of the Airco Style 800 general-purpose oxyacetylene torch, the maker says. The new jet mixer handles all

Steel-Weld FABRICATION



Use WELDED STEEL for Greater Strength with Less Weight!

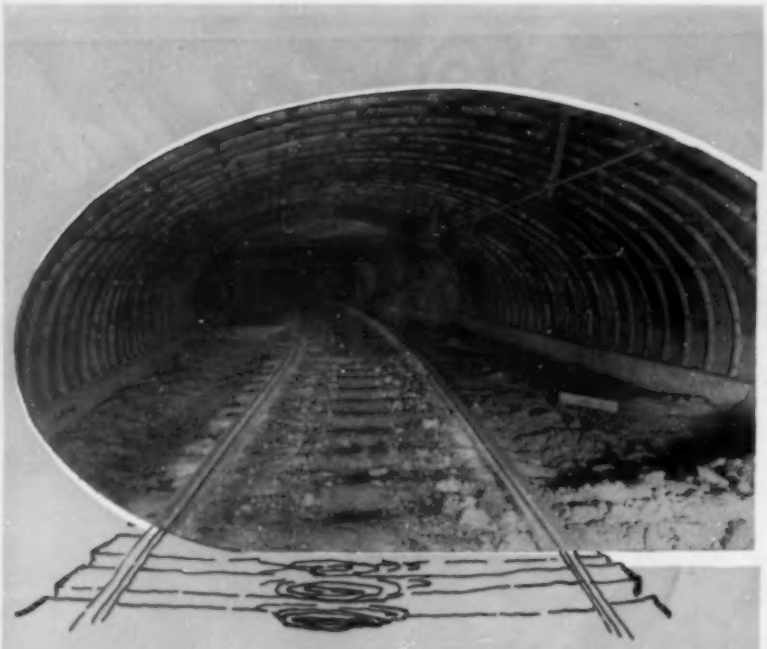
Illustrated here you see a few typical examples of thousands of Steel-Weld Fabricated parts and assemblies produced and machined by Mahon for hundreds of manufacturers of heavy machines and other mechanical equipment. If parts of your product could be redesigned and produced to better advantage through Steel-Weld Fabrication, or, if you require a limited number of large heavy pieces, in which pattern costs are a consideration, you can turn to Mahon with complete confidence . . . personnel and facilities are available within the Mahon plant to do the complete job from drawing board to finished machining. You will find in the Mahon organization a unique source with complete ultramodern fabricating, machining and handling facilities to cope with any type of work regardless of size or weight . . . a source where skillful designing and advanced fabricating technique are supplemented by craftsmanship which assures a smoother, finer appearing job embodying every advantage of Steel-Weld Fabrication. See Mahon's Insert in Sweet's Product Design File, or write for further information.

THE R. C. MAHON COMPANY

DETROIT 34, MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON



safe-economical roof support

Savings are yours when you install "COMMERCIAL" Steel Liner Plates in your mine entries, haulage ways and overcasts; and you will obtain a SAFER roof with many advantages.

"COMMERCIAL" plates are light enough to be handled easily; are designed to quickly erect and bolt into an arch which will carry maximum ring thrust.

Perhaps "COMMERCIAL" can help to support your mine roof better, as so many of their installations have been doing over the years. An experienced engineer will gladly respond to your invitation—at no obligation to you.

Don't let inadequate roof support impair the safety of your men and reduce the tonnage of your mine haulage.

THE COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN, OHIO

"COMMERCIAL"
"PRODUCTS PREFERRED BY CUSTOMER ACCEPTANCE"

WRITE FOR DETAILED DESCRIPTIVE LITERATURE

44-9

welding and heating tip sizes with complete flame stability and has features that minimize sputtering, popping and flashback. The new cutting attachments (Style 1800 cutting steel up to 6 in thick and Style 2800 for steel up to 8 in thick), usable with various tips, permit the Style 800 torch to handle a wide variety of cutting and gouging operations not normally possible with a cutting attachment. Bulletin ACD 837 from Air Reduction Sales Co., New York 17.

(61) **TRACTOR**—An increase of horsepower in the Cat D7 track-type tractor has been announced by Caterpillar Tractor Co., Peoria 8, Ill. The engine brake horsepower at sea level has been increased from 98 to 108 at 1,000 rpm and the tractor drawbar horsepower from 81 to 90. The tractor will now develop a drawbar pull of 22,750 pounds.

(62) **WIRE**—A new type of "Weatherproof Wire," in which the outer braid is glass yarn inherently resistant to moisture, heat, chemical action and abrasion, has been announced by the Rome Cable Corp., Rome, N. Y. It is available in Triple Knit Weatherproof Wire in Sizes No. 14 through 4 AWG. Tests have shown that Weatherproof Wire with a glass outer braid picks up as much as 50% less moisture than cotton-knit wire of the same type, the maker says. Details from Rome Cable.

(63) **FIRE HOSE**—New "Dacro-Flex" fire hose employs a chemically produced polyester fiber as reinforcing filler cords which permit a lighter, more flexible hose with less bulk. Easier to rack and handle in action and requiring less space because it folds tighter, according to the maker, Dacro-Flex is available in 1½- and 2½-in ID sizes in double-jacket construction, with a test pressure of 400 lb. Details from Hamilton Rubber Mfg. Corp., Trenton 3, N. J.

(64) **DOZER BLADE**—The Shunk Mfg. Co., Bucyrus, Ohio, has developed a new special alloy steel cutting edge, called the Rhino blade, for use on bulldozers and scrapers. The blade is precision-machined and rolled to exact specifications and is available in various sizes. Bulletin offered.

(65) **FLOODLIGHT** of sturdy aluminum construction, announced by the General Electric Co., Schenectady 5, N. Y., is an inexpensive unit designed for work and recreational activities in home, farm, and industrial areas. Equipped with ribbed trunnion bracket that permits 360-deg vertical or horizontal rotation, the L-66 floodlight utilizes a 200-w general-service lamp that throws a 946-candlepower beam. The G-E floodlight weighs 4 lb and is provided with a large aluminum base suitable for portable use or permanent mounting. Data from G-E.

(66) **CENTRIFUGAL PUMPS**—Improved design of two basic models of Pioneer seal-type centrifugal pumps featuring an optional third outlet back through the intake port that eliminates external piping has been announced by Pioneer Pump Div., Detroit Harvester Co., Detroit 28,

FIRTHITE "Blue Bit"

MINING TOOLS

The Strongest Braze in any Carbide Tool

Stocked for Quick Delivery in *Every* Coal Mining District

Whenever you need mining tools telephone the nearby Austin Powder Company distributor in your area. Your order will be given immediate attention and promptly filled from stock. This fast-action service can be offered only because Firth Sterling and Austin Powder have teamed up to make and distribute the finest Firthite sintered carbide mining tools available anywhere.

On job after job Firthite "Famous Blue Bits" increase tonnage and reduce cost by minimizing down time and by providing economical operation through maximum tool wear and performance. They come in styles and sizes to meet every mechanized operation.

Call Austin Powder for quick delivery of FIRTHITE "Blue Bit" mining tools.

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Visit our Booth No. F-22 at the Bluefield Coal Show, Bluefield, W. Va., May 26-27-28

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BEE-ZEE SCREENS
SHAPED FOR GREATER SALES!
Tri-Rod — For knife-like separations.
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NEW Bullet Rod — Combines best features of round and tri-rod.
NEW Shielded Bullet Rod — Guards against abrasive action without sacrificing efficiency.
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Full week operation depends upon the salability of your product . . . and Bee-Zee screen shapes and designs, engineered to specific applications, help you produce the best product for your market! Accurate sizing for always dependable uniformity . . . sure separation for constant maximum in Btu content—you get the ultimate in preparation with Bee-Zee screens. They make you money!
All Bee-Zee screens are precision spot-welded of stainless steel. Supporting rods can be spaced for best performance.
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BEE-ZEE SCREENS CAN BE FITTED TO ANY SCREENING EQUIPMENT

Mich. Readily adaptable to both continuous and intermittent pumping operations, the pumps will handle practically all types of liquids not too viscous or too corrosive for modern corrosion-resistant alloys, the company reports, and are designed for flange mounting on the outer surface of a tank or reservoir, eliminating auxiliary inlet piping.

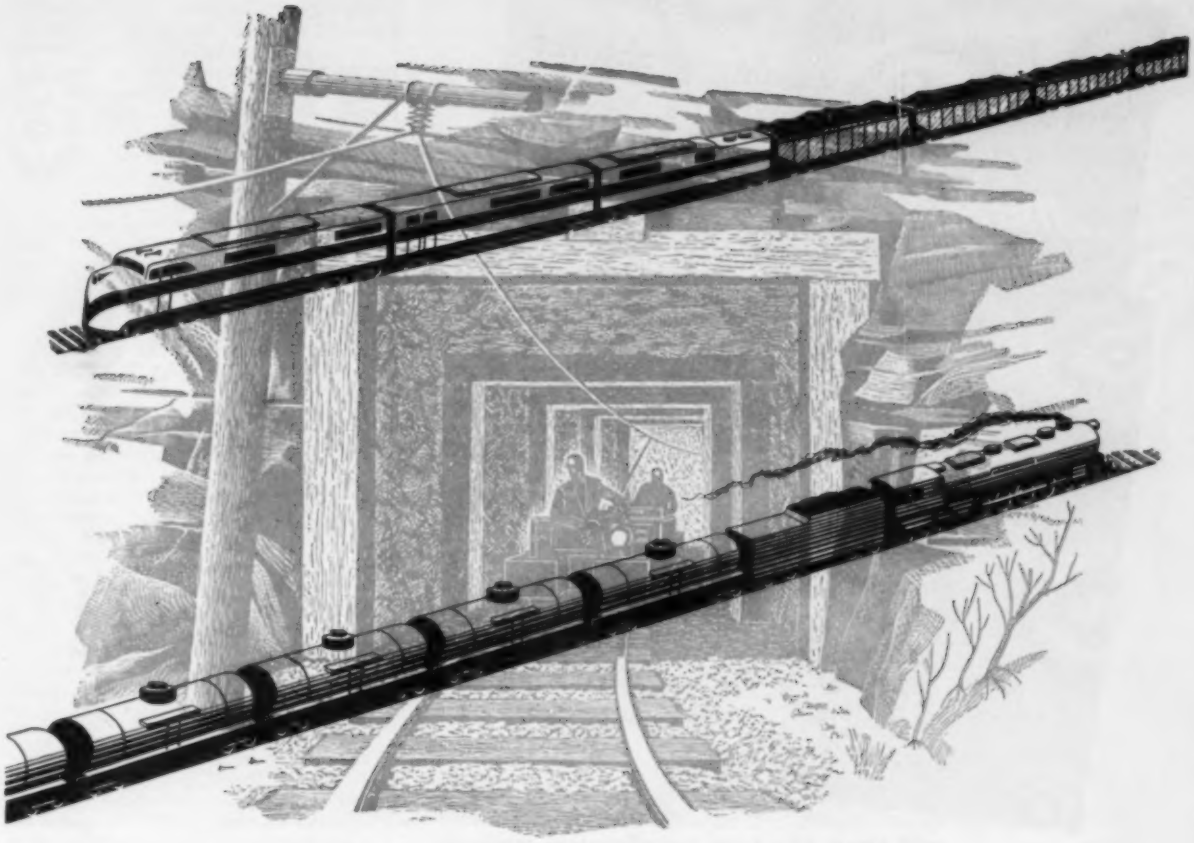
(67) MOTORIZED WHEELBARROW—Model R-15 Kwik-Mix "Moto-Bug" features a 50% increase in hopper capacity, 4-wheel balance and a seat for the operator, and is designed for heavy duty work, the maker says. The new model is now available as a 1-ton hopper or 34x54-in flatbed platform materials-handling unit and is powered by a 8.3-hp gasoline engine with speeds up to 6 mph, forward or reverse. Details from Kwik-Mix Co., Milwaukee 16, Wis.

(68) FUSES—New Type CLF current-limiting fuses added to the G-E line of 250-v and 600-v fuses are one-time cartridge-type, designed for applications where conventional NEC fuses do not have sufficient interrupting capacity. They provide an efficient and economical means of isolating faulty apparatus or circuits before other elements in the distribution system are affected, and also protect back-up devices from let-through energy associated with high short circuits, the maker says. Details from Construction Materials Div., General Electric Co., Bridgeport 2, Conn.

(69) ELECTRODE—A new contact electrode providing high-speed welding and great operator appeal has been announced by the General Electric Co., Schenectady 5, N. Y. Best suited for work on mild and medium carbon steel, the new rod is recommended by the maker for welding machinery, low-pressure storage tanks and light structural work. According to the company, the new product consistently produced a higher rate of weld footage than conventional electrodes during tests and develops up to 80% less spatter than other welding rods.

(70) STRIPED TAPE—Colored diagonally-striped warning signals in quick-to-apply, self-sticking tape form, called Brady Warning Stripes, can be applied to dangerous equipment and in hazardous areas in place of slow, costly hand-painting and stencilling. They are available in rolls 1, 1½, 2 and 3 in wide; in three color combinations of yellow and black stripes, black and white stripes and red and white stripes; and in three self-sticking materials for varying applications. Details from W. H. Brady Co., Milwaukee 12, Wis.

(71) ELECTRIC GENERATORS—New Ready-Power generator series powered by Chrysler industrial engines are designed to deliver full rated power with maximum efficiency and economy and include three sizes of 50-, 30- and 20-kw ratings. Each unit is a complete packaged electric-power generating plant ready for operation, with controls for both engine and generator in a single simplified control cabinet. Bulletin from Ready-Power Co., Detroit 14, Mich.



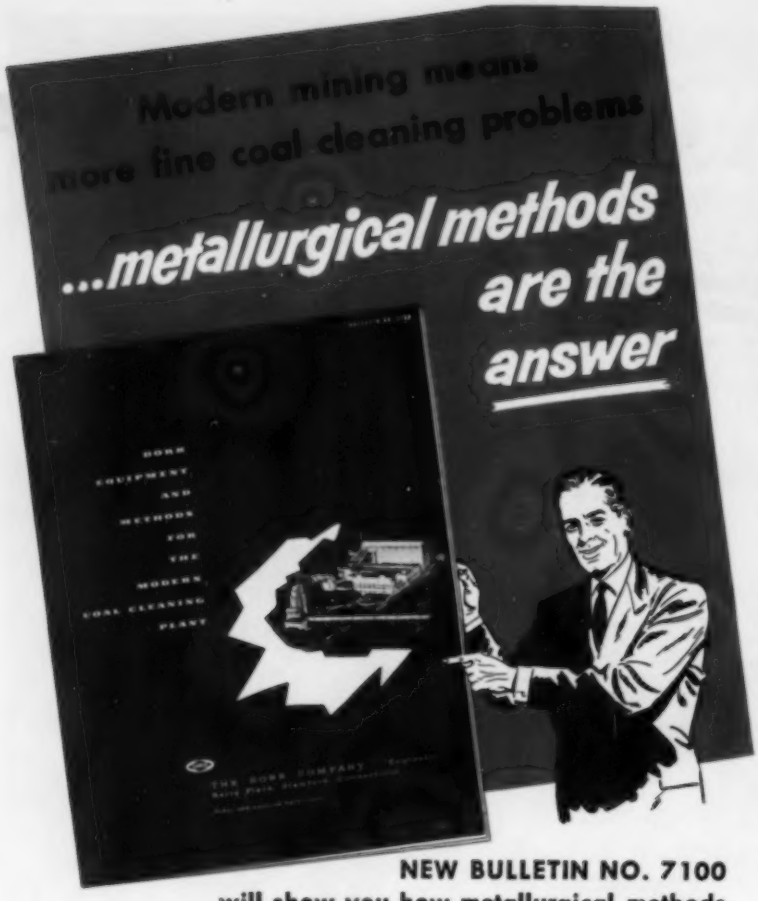
OIL serves the coal industry
COAL serves the oil industry

Much has been said recently concerning the natural competition between coal and oil . . . our two greatest sources of energy. But the fact remains that both industries always have and always will work for each other.

Cities Service research men are constantly at work designing new and better lubricants to make the coal man's job easier. What's more, Cities Service has made available to the entire mining industry expert Cities Service Lubrication Engineers. THESE MEN CAN HELP YOU. Their quick, concise lubrication survey can mean important dollar-savings and time-saving. The Cities Service lubricants that they might recommend can do the finest job throughout your operation. Why not get your free lubrication survey from an expert Cities Service Lubrication Engineer? If you're operating at maximum efficiency, he'll be quick to tell you so. If improvements can be made, he'll show you where. For his invaluable FREE services, call or write the office nearest you or the Cities Service Oil Company, Sixty Wall Tower, New York City 5, New York.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



NEW BULLETIN NO. 7100
will show you how metallurgical methods can help you solve the problems of . . .

- ✓ *dewatering* table feed, concentrates and tailings
- ✓ *slimes thickening* and water clarification
- ✓ *desliming* for fine coal recovery
- ✓ *pumping* and metering underflow from Thickeners and Hydroseparators

Today's mechanized mining and loading techniques have resulted in greater production and economy for the coal producer. But they've brought him problems too . . . in the form of vastly increased quantities of non-coal products in washing plant feed. Tough too, for the washing plant operator is today's emphasis on better coking coal quality and the increasing stringency of stream pollution regulations.

If these problems sound familiar to you, it will pay you to write for Bulletin #7100, "Dorr Equipment and Methods for the Modern Coal Cleaning Plant." It will tell you how *proven* metallurgical methods can be applied. The Dorr Company, Engineers, Stamford, Conn.

Better Tools TODAY to meet tomorrow's demand.

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THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in principal cities of the world.

(72) TRACTOR IMPROVEMENTS—A new heavy-duty track roller frame and special large idlers for the 60-in-gage Cat D4 track-type tractor are now being made by Caterpillar Tractor Co., Peoria 8, Ill. The new arrangement is especially adaptable whenever difficult terrain is encountered in bulldozing and other operations. There are heavier "boxed-in" frames and replaceable wear strips for the front idler hold-down bearings. Details from Caterpillar.

(73) VALVES—Grooved-end gate valves in the 225-lb W.O.G. "King-clip" and 200-lb W.O.G. iron-body bronze-mounted patterns in various sizes have been added to its line by The Lunkenheimer Co., Cincinnati, Ohio. In addition to reducing labor costs, the new Lunkenheimer valve design requires less time to install and eleminates the necessity for using grooved-end adapters to connect screwend or flanged-end valves where grooved-end pipe and couplings are being used to obtain greater flexibility, it is said.

(74) RHEOSTAT—New Bulletin 1116 Vitrohm ring-type 300-w rheostat is designed for use in AC and DC circuits where smooth, accurate current control is essential and is particularly useful where "stepped" rheostats do not furnish sufficiently close adjustment, the maker says. Catalog sheet from Ward Leonard Electric Co., Mt. Vernon, N. Y.

(75) OVERLOAD DEVICES—A new line of compact adjustable torque-limiting over-load protection devices for a wide variety of machine drives is available from Morse Chain Co., Detroit 10, Mich. Called Morse torque limiters, these slip-type friction clutch devices feature a powdered metal bushing on which such drive components as chain sprockets, V-belt pulleys or gears can be mounted and are available in 11 standard models giving maximum torque capacities from 20 to 620 ft-lb. They act as automatic shear-pin mechanisms that avoid the time and labor required to insert new shear pins, need no resetting and are tamperproof, the company says.

(76) METAL-CONCRETE FLOORS—New industrial flooring process called "Metal-Seeded Dynapakt" is said to add the strength of iron to heavily-traveled concrete floors by installing an 8-in "veneer" of iron-chip aggregate as a non-spalling, non-crumbling non-slip armor over fresh Dynapakt concrete topping. The flooring operation is performed with special heavy-duty power equipment to insure maximum compaction and adhesion of concrete and metal. Bulletins and details from Flash-Stone Co., Inc., Philadelphia 44.

(77) ELECTRODE—The Lincoln Electric Co., Cleveland 17, has announced the second electrode in its newly developed line of electrodes with powdered metal in their coatings. A companion electrode to Jetweld 1 for welding horizontal and flat fillet joints, Jetweld 2 is made for high-speed welding of butt and deep groove joints at low cost per foot of weld, with excellent X-ray qualities, easy slag removal, top physical properties, smooth appearance and low crack sensitivity.

Thermoid Hose designed specifically for use in mines

Thermoid Industrial Rubber Products — Quality Value Service

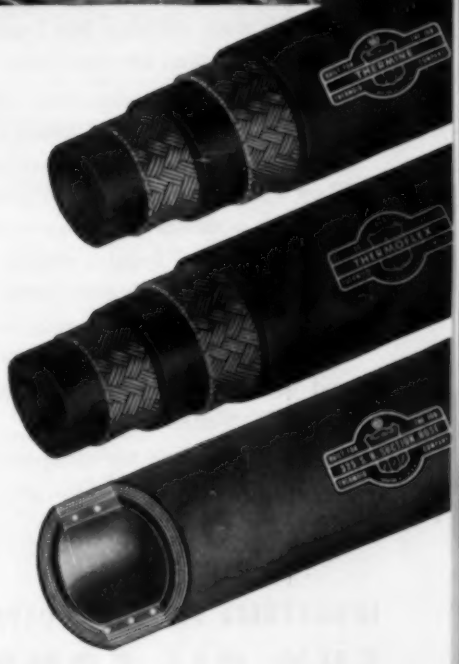
Thermoid designs and manufactures many types of hose built to give longer service and lower operating costs in a wide variety of specific applications. These 3 are ideal for rugged mining work:

THERMINE — Heavy duty air hose, mandrel-built with oil resistant tube reinforced by high tensile yarn. Smooth, abrasion-resistant cover.

THERMOFLEX — Mandrel-built air hose for extreme service and direct connection to compressors. Smooth, black, abrasion-resistant cover.

#325 SUCTION HOSE — For heavy duty water suction service. Smooth bore, wrapped hose with heavy wire reinforcement, durable cotton duck plies.

Thermoid research is responsible for new, better construction that makes Thermoid hose more durable . . . easier to handle. Your Thermoid Distributor can help you select the hose best suited for your requirements. Or if you prefer write direct for catalogs.



Thermoid

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

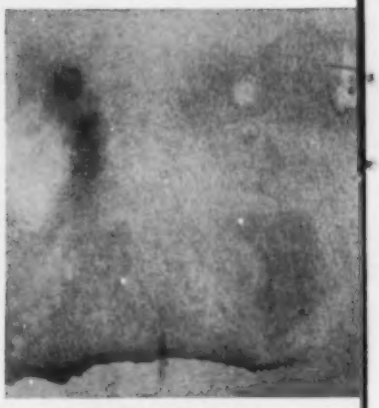
Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

HOW NEW SOLNUS OILS HELP MAKE AIR COMPRESSORS FIRE SAFE

Actual photographs show amounts of carbon residue left after dropping equal quantities of Solnus and two other oils on steel plates and baking in a closed oven at 500°F for 24 hours. The three oils all had viscosities of 300 SUS at 100°F.

SEE HOW CLEAN SOLNUS LEAVES HOT METAL



New SOLNUS Oil 0.9%

Typical Naphthenic Oil 5.5%

Typical Paraffinic Oil 9.0%

The biggest cause of air compressor fires or explosions is carbon formation on valves and in discharge lines. The best way to avoid these risks is to use the lubricating oil having the lowest tendency to form carbon.

New Solnus Oils have been proved ideal for air compressor use. The minute amounts of carbon that will form are of a fluffy nature; so they blow off quickly and do not build up. Thus the danger of fire or explosion is largely removed.

Solnus Oils have other important advantages, too. Your compressors need cleaning less frequently. This reduces maintenance costs. Shutdowns are less likely. Plant efficiency is increased.

Solnus Oils are also ideal for circulating systems, hydraulic systems, gear boxes, and general lubrication of your industrial equipment. They simplify your storage problems by doing with *one oil* many jobs that would otherwise require *several*. Combine their ability to protect metal parts against corrosion, their resistance to oxidation, and their moderate price and you see how Solnus Oils give you "more lubrication per dollar."

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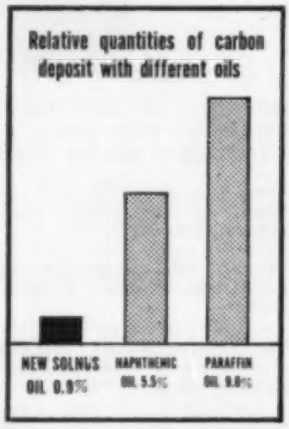

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News Round-Up

Utility Joins in Coal Pipe Line

A 110-MI PIPE LINE for the haulage of coal from mine to market appeared on the verge of becoming a reality last month as the Cleveland Electric Illuminating Co. announced April 20 that it would spend around $2,500,000 to build a northern terminus for the line.

Pittsburgh Consolidation Coal Co., which has had the pipe-line project under study for several years, announced that it had retained an independent engineering firm to appraise its cost estimates on building and operating a commercial pipe-line system as "a preliminary step to our proceeding with the construction of such a system." The final decision to go ahead is dependent on the engineering report and no construction contracts have been let.

Should the studies confirm present cost data, construction of the pipe line is expected to be begun during 1954, it is understood. Cost to Pittsburgh Consol for construction of the line is currently estimated at $7,500,000, and it is believed to offer savings of about $1.25 a ton over the present rail freight rate, a saving that would be shared by the utility and the coal company. The line is being designed for a capacity of 4,000 tpd and would handle a slurry consisting of half water and half minus ⅛-in coal.

As now planned, the pipe line would begin at the Georgetown (Ohio) stripping of Pittsburgh Consol's Hanna Coal Div. However, the company has previously reported that pipe-line haulage of coal is feasible at least up to 300 mi, and the possibility of other projects is believed to depend on freight rates applying in specific localities. As a result, there is currently a tendency on the part of the railroads to check into their rates, it is understood.

Drive on Oil, Gas Draws Wide Following

Twin drives aimed at curbing imports of residual oil and blocking imports of natural gas gathered momentum in April as coal interests sought the support of other industries suffering from the flow of foreign goods to the U. S.

Members of the Foreign Oil Policy Committee took their pleas to industrial and business interests in the Midwest, New England and other areas. Leveling their fire at the free-trade recommendations of the Randall Commission, FOPC speakers in Milwaukee, Wis., cited the threat to lumber, electrical-equipment and motorcycle industries; in Indianapolis, Ind., to chemicals, pharmaceuticals, wood products and small plants; and in Boston, Mass., to industries producing textiles, watches, etc.

Meanwhile, National Coal Association, calling for support of the Hunt Bill to forbid imports of natural gas from Canada and Mexico, urged coal producers and others to voice their endorsement of the measure to legislators in Washington. Twin bills (H. R. 4227 and S. 1287) have been introduced in the House by Rep. D. R. Stringfellow (R., Utah) and in the Senate by Sen. L. C. Hunt (D., Wyoming). Sen. W. A. Purtell (R., Conn.), chairman of the Subcommittee on Business & Consumer Interests of the Senate Interstate & Foreign Commerce Committee, has scheduled hearings on the Hunt bill for May 13 and 14.

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TVA Awards 22 Contracts for 4,447,300 Tons

Placing of 22 coal contracts, for a total of 4,447,300 tons costing $14,448,421, was announced March 30 by the Tennessee Valley Authority. Largest single contract was that with the Nashville Coal Co., Inc., for 1,050,000 tons at $4,179,000, expected to be produced at the new Uniontown Coal property.

As reported, the awards and TVA plants to receive deliveries are:

Widows Creek Steam Plant—West Kentucky Coal Co., Madisonville, 60,000 tons, $118,200; Capitol Coal Sales, Inc., Chattanooga, 20,000 tons, $85,600.

Watts Bar Steam Plant—Capitol Sales, Inc., Chattanooga, 164,600 tons, $650,170, also 78,000 tons at $339,300 and 15,600 tons at $68,640; Harriman Coal Co., Harriman, Tenn., 32,500 tons, $160,875; Bransford Coal Co., Nashville, 468,000 tons, $2,124,720; Williams Coal Co., Chattanooga, 187,200 tons, $861,120; Capitol Coal Sales, Inc., Chattanooga, 187,200 tons, $861,120, and 117,000 tons at $538,200.

Johnsonville, Shawnee & Colbert Steam Plants—Nashville Coal Co., Nashville, 20,000 tons, $69,200; Dawson Coal Co., Dawson Springs, Ky., 52,000 tons, $111,800; Capitol Coal Sales, Inc., Chattanooga, 52,000 tons, $114,400; United Electric Coal Cos., Chicago, 156,000 tons, $312,000; Twentieth Century Coal Co., Inc., Beaver Dam, Ky., 200,000 tons, $468,000; Beaver Dam Coal Co., Louisville, Ky., 450,000 tons, $1,057,500; Southern Coal Co., Chicago, 780,000 tons, $1,833,000; Southern Coal Co., Chicago, 221,000 tons, $464,100; Truax-Traer Coal Co., Chicago, 31,200 tons, $66,144; Walter Bledsoe & Co., Terre Haute, Ind., 234,000 tons, $561,000; Beaver Dam Coal Co., Louisville, 70,200 tons, $158,652; Nashville Coal Co., Inc., Nashville, 1,050,000 tons, $4,179,000.

TVA Fertilizer Plant—DeBardeleban Coal Corp., Birmingham, 18,000 tons, $106,200.

Cancel UMWA Contracts

Several coal producers in Pennsylvania, Virginia and Kentucky have cancelled their contracts with the UMWA and others are threatening to do so, it was reported last month. In Pennsylvania, John M. Dovey, president of the Cambria Fuel Co., which operates deep mines in Somerset County, announced April 2 that he had notified John L. Lewis, UMWA head, that the company would begin operation without a contract May 1. He reported that the action was necessary because of market conditions and competition from neighboring strip and deep mines, some of which are non-union. In writing Mr. Dovey said: "We are only seeking self-preservation and the right to operate our mines to the best interest of the company and its employees." In eastern Kentucky, the Marlowe Coal Co. early in April notified the UMWA that it was cancelling its contract for two mines in Perry County, its Marlowe mine and that of the Stoker Coal Co., employing about 85 and 80 men, respectively. The union may take legal action to prevent the growing trend to independent operation, the Louisville *Times* reported. A spokesman in the UMWA Washington office, the newspaper said, questioned the legal right of individual operators to cancel contracts negotiated with the producer associations and added that "any producers who try to go non-union are taking a very short-sighted view. Cutting the miners' pay isn't going to solve any problems."

News Briefs and Trends

New Group Takes Control of Lehigh Valley Coal Co.

A complete new board of directors for the Lehigh Valley Coal Co., one of the major anthracite producers, was elected April 7 following a 15-hr vote-counting session during the 2-day annual meeting in Wilmington, Del. The management-supported slate, headed by L. R. Close, company president for 21 yr, was defeated by a vote of 1,148,407 to 797,270 shares. Elected directors to represent the new group which had sought control because of lowered earnings were: Arch J. Alexander, Charleston, W. Va., former chief of the West Virginia Department of Mines; Walter J. Schallitz, Sands Point, N. Y.; H. W. Bradbury, Sparta, Ill., president of the Midwest Utilities Coal Corp.; Charles W. Yetter, Grand Junction, Colo.; John M. Addison and Frank W. Ford, New York. The new management announced that it would not disclose its plans until after a reorganization meeting later in the month but emphasized that diversification of products and economy of operation were important factors in its program.

1954 Bluefield Show Expected To Be Largest in History

More than 240 exhibitors, the largest number in the show's history, will display their products and services at the 1954 Southern Appalachian Industrial Exhibit, to be held in Bluefield, W. Va., May 26-28, W. L. Osborne, general chairman of the show, and James B. Wooldridge Jr., director, have announced. Held on alternate years with the AMC Exposition in Cleveland, the Bluefield Coal Show is the only industrial and mechanical mining exhibit actually staged in the heart of the coal fields. More than 55,000 people attended the 1952 show. As in the past, the 3-day program will include various special events, such as the Pioneer Miners' Reunion of men who have worked for 40 yr or more without a lost-time accident; a display of "gadgets" and inventions; and a beauty contest to select "Queen Bituminous" to preside at the show.

New Kentucky Power Plant To Use 1,080,000 Tons of Coal

Construction of a new electric generating plant of 424,000-kw capacity, soon to be started in Mercer County, in Central Kentucky, will create an annual market for 1,080,000 tons of bituminous coal, according to engineering estimates. The plant will be built by Kentucky Utilities Co. to fill rising power demands resulting from a post-war expansion in Kentucky industry within the area served by the utility. The new plant, to be situated at Dix Dam, will be at the hub of Kentucky Utilities' 75-county system, R. M. Watt, president, pointed out. According to reports, construction is scheduled to begin about May 15 and the first generating unit of about 106,000 kw will go into operation in 1956, with other units to follow as needed.

Natural-Gas Rate Increases Okayed by FPC Jump Sharply

The $81,990,100 in wholesale natural-gas rate increases granted by the Federal Power Commission in the last 9 mo was more than twice the combined total of the two previous fiscal years, Jerome Kuykendall, FPC chairman, reported April 8. The commission now has pending 38 rate cases asking about $103,608,000 in annual rises, he said. The 9-mo total involved 26 cases in which increases of $115,648,600 annually had been sought. The FPC disallowed $31,490,500, or 27.2%, and an additional $2,168,000 of petitions were withdrawn because of settlements in related cases.

J&L Div. Sets Safety Record

The Vesta-Shannopin Coal Div. of the Jones & Laughlin Steel Corp., California, Pa., set a new record for safe mining in 1953, with its 3,640 employees working 6,682,800 man-hours to produce 4,948,017 tons with but one fatality. In commenting on the accomplishment, which broke the division's previous record, E. R Cooper, general manager of coal mines for J&L, said: "The 1953 record of J&L's Vesta-Shannopin Coal Div. is the best record for the year in Pennsylvania."

European Coal-Steel Pool To Get Big U. S. Loan

The European Coal & Steel Community will receive a $100,000,000 loan from the United States to help finance increased productivity in the coal and steel industries and revive the capital market in Western Europe. The Coal & Steel Community Treaty, ratified in 1951, aims at breaking down trade barriers. It includes six nations: France, West Germany, Italy, The Netherlands, Belgium and Luxembourg.

Biggest Summer Discounts Offered by Anthracite

With the sharpest mine-price reductions in recent years now being announced by Anthracite producers, retailers are expected to offer customers the largest summer discounts in the hsitory of the business, according to an announcement early in April by Everett Decker, chairman, Eastern States Solid Fuel Conference. He predicted that discounts would run as high as 10% by May 1. The Hudson Coal Co., first producer to announce off-season prices, effected reductions ranging from 55c per ton for rice to $2.15 for chestnut.

Sharp Cited as First Recipient of "Clinchfield Man of the Year" Award

JAMES F. SHARP (left) receives from R. H. Hughes, president of the Clinchfield Coal Corp., a citation as the first winner of the newly established annual award naming the "Clinchfield Man of the Year." The presentation took place at the company's annual banquet in honor of its supervisory and technical personnel held in Bristol, Va., Feb. 27. In announcing the new award, Mr. Hughes outlined the basis and method of selecting the recipient and emphasized that any Clinchfield man was eligible to receive it. Mr. Sharp joined Clinchfield May 4, 1948, as general foreman at the Dante operations and on Feb. 1, 1949, was promoted to superintendent of the Moss mine. On April 25, 1952, Mr. Sharp was made superintendent of the Clintwood Div., which includes two of Clinchfield's largest and most modern operations, Moss and Meade mines.

In his presentation, Mr. Hughes pointed out that under Mr. Sharp's guidance the Moss mine became the largest commercial coal-producing mine in the United States in 1953, with an output of 2,570,229 tons in that year. Clinchfield's total output of 6,576,904 tons in 1953 was an increase of 10.4% over 1952, as compared to the 3.6% loss in production for the industry as a whole, Mr. Hughes reported. The citation honored Mr. Sharp "In recognition of his excellent leadership and distinguished achievements in the performance of his duties and his contribution to the success and progress of his associates and company during the year of 1953."

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Anthracite Stabilization, Higher Prices Forecast

A stabilized anthracite industry and a higher price level for anthracite by fall that "will provide producers with a break-even realization at the very least," was forecast April 7 by Edward G. Fox, president, The Philadelphia & Reading Coal & Iron Co.

Mr. Fox saw these developments as the result of the industry's Production Control Plan which went into effect March 29. The plan, Mr. Fox emphasized, is designed to eliminate price cutting which he estimated cost producers "not less than $20 million in 1953" and to reduce to a minimum the competition from dumping of substandard coal.

Speaking at the Greater Philadelphia Fuel Conference at the Bellevue-Stratford Hotel, Mr. Fox described reestablishment of the Production Control Plan as the greatest step in meeting these problems. With it, anthracite operators are gearing themselves to a production in keeping with today's market, so that this production can be maintained with a justifiable profit to producers, he said.

Actually, he pointed out, the plan does not prohibit the production of substandard coal, which he estimated at 10% of the anthracite market in 1953. "It does provide," he went on, "that this low-grade anthracite shall not be placed on the market without the full knowledge of the retail purchaser or the ultimate consumer." He added that the industry will be closely policed and violators of this portion of the plan dealt with according to law.

Mr. Fox pointed out that the new spring prices announced by his company were an effort to establish a realistic point from which progressive advances could be made to fair average prices by fall to promote consumer buying and better working time at the mines. He added that it is "reasonable and common sense to assume that prices through the year 1954 will gradually climb above the spring circular until the prices this fall will be at a level which will assure an average yearly price, so that producers will at least reach a break-even realization. Unless this is done," he continued, "the producer will place himself in a very difficult financial position."

Electric Utility Coal To Rise Sharply by 1958, New Directory Reports

New generating units scheduled by electric utilities for completion by the end of 1958 will raise the industry's coal burning capacity by 61,000,000 tons. In the present year, 17,000,000 tons of new capacity is scheduled for completion; in 1955 and 1956, 15,000,000 tons each year; in 1957, 8,000,000 tons; and in 1958, 6,000,000 tons.

These facts, revealed in the new *Directory of Electric Utility Coal Burning Plants* published by *Keystone Coal Buyers Manual*, a *Coal Age* affiliate, throw a cheerful light on the outlook for the bituminous industry. Assuming that the utilities in future years continue to generate the same percentage of their total power output from coal as they did in 1952, total coal-consumption capacity of the utilities will rise as follows, *Keystone* predicts:

Year	Predicted Coal Burn (Tons)
1954	132,000,000
1955	147,000,000
1956	162,000,000
1957	170,000,000
1958	176,000,000

To meet the growing needs of the utilities, the coal industry must expand its production. *Keystone* predicts that Indiana and Ohio will lead in per cent of growth, followed by Illinois, Kentucky and Tennessee. Slightly slower rates of expansion are expected for West Virginia, Alabama and Pennsylvania.

The 110-p *Directory of Electric Utility Coal Burning Plants*, 6x9 in size, lists all privately owned, federal and municipal power plants that burn coal. Other data include names, addresses and titles of company executives and plant officials responsible for fuel selection and purchase; plant and system capacity in kilowatts; tons of coal consumed in 1951, 1952 and, in some instances, 1953; sources of coal by producing district; estimated coal-burning capacity by 1958; and scheduled capacity additions year by year. Data are arranged by company, state and region.

The directory may be obtained from *Keystone Coal Buyers Manual*, 330 West 42d St., New York 36. Price is $10.

MEETINGS

West Virginia Coal Mining Institute and Central Appalachian Section, AIME: Joint Spring Meeting, May 14-15, Hotel Morgan, Morgantown, W. Va.

Southern Appalachian Coal Operators' Association: Semiannual Meeting, May 21, Knoxville, Tenn.

Southern Appalachian Industrial Exhibit, May 26-28, Bluefield, W. Va.

Central Pennsylvania Coal Producers' Association: Meeting, May 27, Penn-Alto Hotel, Altoona, Pa.

Big Sandy-Elkhorn Coal Operators' Association: Annual Meeting, June 4, Lexington, Ky.

American Retail Coal Association: Annual Meeting, June 15-16, Sheraton-Gibson Hotel, Cincinnati, Ohio.

American Coal Sales Association: Annual Meeting, June 23-27, Hotel Broadmoor, Colorado Springs, Colo.

Mine Inspector's Institute of America: 44th Annual Convention, June 28-30, William Penn Hotel, Pittsburgh, Pa.

Rocky Mountain Coal Mining Institute: Annual Meeting, June 28-30, Denver, Colo.

Open Pit Mining Association, Electrical Div.: 10th Annual Meeting, July 1-2, Androy Hotel, Hibbing, Minn.

Automatic Ash Removal Tops Anthracite Home-Heating Show

The first Anthracite Industry Domestic Equipment show, staged throughout the month of April in New York City, drew throngs of architects, home builders, heating- and ventilation-equipment dealers and housedwellers to the display rooms and spurred wide interest among writers for architectural, construction, "shelter" and coal-industry magazines and editors of "home" departments of daily newspapers. Over 100 writers and editors saw the display at a preview April 5.

Sharpest interest centered on a vacuum system for automatic removal of ashes from both automatic and hand-fired burning equipment. The new system, developed by Lehigh Valley Coal Co. and known as Lehigh Valley Ashaway system, carries ashes through sealed tubes to a container outside the house. It climaxes a long search by the anthracite industry for ways to make anthracite a more convenient home fuel.

In addition to vacuum ash removal, the display offered the initial demonstration of the application of several types of automatic anthracite burners to year-round air-conditioning systems. Also shown were the latest models of burners for warm air and radiator heat, all of them fed from sealed, dust-proof storage spaces and attractively designed for basement recreation rooms.

Visitors to the display were given a copy of "Automatic Anthracite Equipment for the Home," a descriptive booklet now available upon request to Anthracite Information Bureau, 380 Madison Ave., New York 17. Equipment manufacturers, distributors, industry representatives and engineers were on hand to explain and demonstrate the equipment on display.

Exhibits included the Anthratube, manufactured by Axeman-Anderson Co., Williamsport, Pa.; the Anthro-Flo boiler and Anthra-Flo furnace, manufactured by Coal-O-Matic Co., Trucksville, Pa.; Loline boiler, manufactured by Loline Boiler Co., Allentown, Pa.; Motorstokor boiler-burner unit, manufactured by Motorstoker Div., Hershey Machine & Foundry Co., Manheim, Pa.; Electric Furnace Man furnace burner unit, manufactured by Electric Furnace Man Co., Emmaus, Pa.; and Ashaway system, distributed by Lehigh Valley Coal Sales Co. Air-conditioning equipment was displayed by York Air Conditioner, New York City.

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Users of industrial and metallurgical coals are quick to recognize the advantages of oil treating. Let us show you how PERMATREAT Coal Spray will make your coals more acceptable to these large users.

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Personal Notes

William R. Stedman, since 1950 general superintendent, Gary, W. Va., and Lynch, Ky., district mines, U. S. Steel Co's Coal Div., has been appointed general superintendent of the coal division's Frick district, Uniontown, Pa. **August R. Werft,** for the past 3 yr, chief engineer, has been named assistant general superintendent, and **Jesse F. Core** succeeds

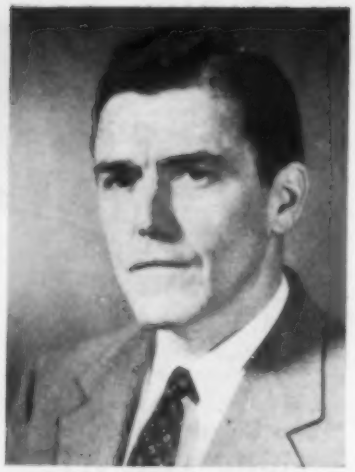
Continued on page 146

Pocahontas Fuel Advances Operating Officials

A. VERNON SPROLES (left), a veteran of 45 yr of service with Pocahontas Fuel Co., Inc. and its predecessor, Pocahontas Consolidated Collieries Co., has been appointed vice president in charge of operations. In 1944 he was appointed general superintendent of mines, a position he has held until his recent appointment. P. P. Ferretti (right), assistant general superintendent of mines, has been named to succeed Mr. Sproles. Prior to joining Pocahontas Fuel in 1952, Mr. Ferretti had been associated with the Goodman Mfg. Co. and the Clinchfield Coal Corp., where he was production engineer.

Named to New Posts With Alabama Power

HARRY M. JOHNSTONE (left) last month became consultant on coal operations for the Alabama Power Co., Birmingham, and was succeeded as general manager of the Gorgas coal mines by James A. Hagy (right). A graduate of Alabama Polytechnic Institute, Mr. Johnstone joined the company in 1942 and served as manager of the Gorgas property until named general manager last year. Mr. Hagy, a graduate of Virginia Polytechnic Institute, was in charge of various coal operations in West Virginia before joining Alabama Power as mine superintendent last September.



Cassidy Heads Renton Coal

SAMUEL M. CASSIDY, vice president of the Pittsburgh Consolidation Coal Co., last month was elected president and a director of the Renton Coal Co., an operating company jointly owned by the Great Lakes Steel Corp. and Pittsburgh Consol. Mr. Cassidy succeeds G. A. Shoemaker, executive vice president of Pittsburgh Consol. Before moving to the Pittsburgh headquarters of the parent company last year, Mr. Cassidy was president of the Consolidation Coal Co. (Ky.) Div.

Gibbons New Hanna Div. Head

CHARLES A. GIBBONS, with the company since 1931, has been appointed president of Susquehanna Collieries Div. of The M. A. Hanna Co. Joining the Susquehanna Collieries Co. in 1931 as mine manager, he was elected operating vice president in 1937, and when the company merged with The M. A. Hanna Co. in 1947, he was elected division vice president and general manager. In 1948, Mr. Gibbons was given additional duties as director of sales of the Anthracite Div.

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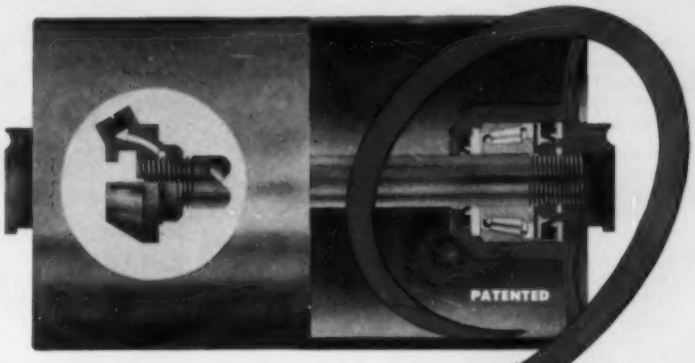

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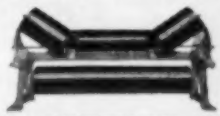

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Mr. Werft as chief engineer for the Frick district. **Woods G. Talman,** since 1950 assistant general superintendent of the Gary and Lynch district, succeeds Mr. Stedman as general superintendent of that district. Succeeding Mr. Talman as assistant general superintendent in Gary is **Charles W. Connor Jr.,** who has held the same post in the Frick district since June, 1951.

George A. Shoemaker, executive vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., has been elected to the board of directors of the Dravo Corp. Mr. Shoemaker also is president of Mathies and Harmar Coal companies.

Lillybrook Coal Co., Beckley, W. Va., has made the following personnel changes at its Killarney mine: **Nimmie Maloney,** night foreman, and a veteran of 28 yr in the mining industry, has been promoted to general mine foreman. **William C. Blizzard,** section foreman since 1953, has been named general night foreman. **Willard L. Fielding** has been named chief electrician, succeeding **Ed Setliff,** who has been appointed day tipple foreman. **Hiram Queen** and **Lewis P. Bryant** have been named section foremen. **Walter Setliff,** former day tipple foreman, has been transferred in the same position to the night shift.

Three promotions among supervisory officials of the Jamison Coal & Coke Co. were announced last month by G. W. McCaa, general manager. **Ralph C. Ison,** general mine foreman, Jamison No. 9 mine, Farmington, W. Va., has been promoted to superintendent, Jamison No. 21 mine, Hostetter, Pa. Prior to joining Jamison, Mr. Ison held supervisory positions in West Virginia and Kentucky, and was associated with Island Creek Coal Co. **John Neer** has been promoted from night mine foreman to general mine foreman, No. 9 mine. **Arthur Merrifield,** formerly section foreman, has been made night mine foreman, succeeding Mr. Neer.

Henry J. Hager, formerly general superintendent, Alabama By-Products Corp., Birmingham, Ala., has been elected vice president—mining operations. **F. G. Koenig Jr.** was named executive vice president of the company.

Edward B. Tubridy, former resident engineer, Federal No. 1 mine, Coal Div., Eastern Gas & Fuel Associates, has been appointed production engineer of the Northern group of mines. **Squire R. Barrett,** former resident engineer at the Helen operation, has been named to succeed Mr. Tubridy.

Obituaries

William H. Cooke, 55, general superintendent, Peach Creek mine, Jewell Ridge Coal Co., Logan County, W. Va., died March 29, when his private single-engine plane crashed at McDonald Airport, near Logan, W. Va.

Denver Nelson, 39, mine foreman, The Elk Horn Coal Corp., Hemphill, Ky., died March 26, following a heart attack, at the Fleming, Ky., hospital.

L. EBERSOLE GAINES

L. Ebersole Gaines, 61, president, The New River Co. since 1939, died suddenly April 16 at Mt. Hope, W. Va., following a heart attack, during a meeting in the office of J. A. Hunt, executive vice president of the company. Widely known throughout the coal industry for his service to its interests, Mr. Gaines was president of the National Coal Association in 1947-48 and had been active in that and other coal organizations for many years. A graduate of Princeton University, Mr. Gaines practiced law until he became engaged in industrial activities in the 1930's and served as mayor of Fayetteville, W. Va., for 7 yr. In 1935, he was named vice president and director of the Amherst Coal Co. and the Logan County Coal Corp. At the time of his death, Mr. Gaines was serving his 13th yr as president of the West Virginia Coal Association, and was a director of the Amherst Fuel Co., the Buffalo Creek Coal & Coke Co., the Merchants & Miners National Bank of Oak Hill, and the Chesapeake & Potomac Telephone Co. of W. Va.

JOHN LYONS

John Lyons, 66, safety engineer, Bell & Zoller Coal Co., Zeigler, Ill., from 1928 until his retirement Apr. 30, 1953, died Mar. 31, while visiting his daughter in Rockmart, Ga. Born in England, he came to the U. S. in 1912, and joined the company in 1926 as an examiner. Prior to his retirement, Mr. Lyons served the coal industry for 53 yr.

James D. McLaughlin, 68, president, New Alma Coal Co., and Earlston Coal Co., Kermit, W. Va., and treasurer of the Williamson Coal Operator's Association, died March 30 in a Huntington, W. Va. hospital.

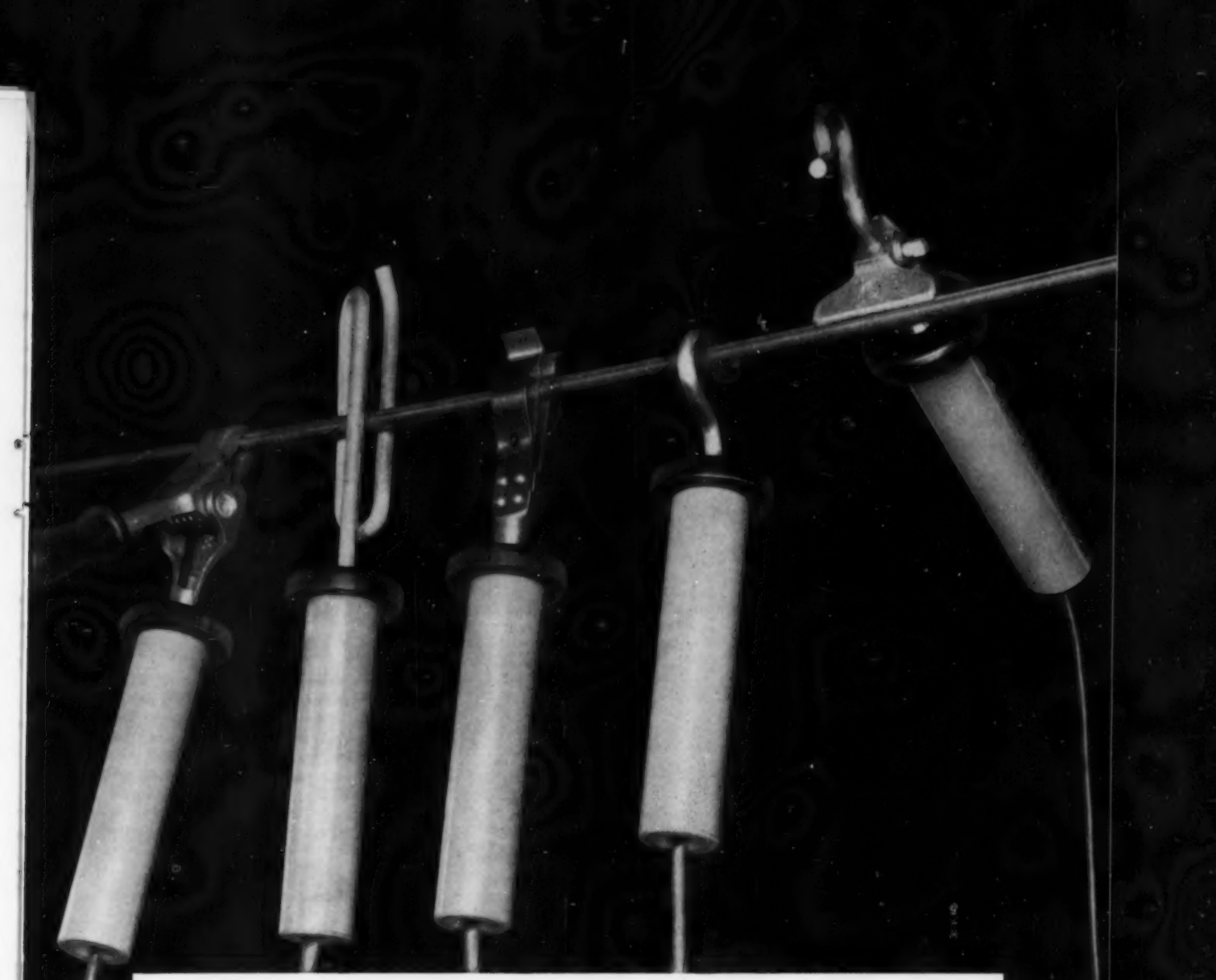
James E. Palmer, 82, retired coal operator and banker of Providence, Ky., died March 20 at a hospital in Evansville, Ind. He was for many years associated with his brothers, S. D. Palmer and M. C. Palmer, in the operation of the Diamond Coal Co., Diamond, Ky., prior to his retirement.

Horace M. Lawrence, 64, since 1931 in charge of standardization projects for building codes, construction operations, materials and mining for the American Standard Association, New York, died Apr. 6 at a Teaneck, N. J., hospital. After his graduation from MIT in 1913, Mr. Lawrence worked in mining and metallurgical engineering in many states, as well as Alaska and Canada. He was with the USBM for 5 yr before joining the association.

Pasquale Adonizio, 73, president, Duryea Anthracite Coal Co., Pittston, Pa., died Apr. 9, in Pittston. Familiarly known in the anthracite industry as Tony Rose, Mr. Adonizio was identified with many mining operations including Sterrick Creek and Lackawanna collieries of the Temple Coal Co., at Jessup, the mines at Boston Settlement, Jenkins Township, the Jermyn Colliery and the Morea and Cranberry Coal companies.

New Alabama Plant to Use Coal Chemicals Exclusively

Alabama By-Products Corp. and Hercules Powder Co. announced April 7 that they are working out plans for a joint undertaking for a new manufacturing facility to be located in the Birmingham district. The plant is designed for initial production of 45,000 tons per year of anhydrous ammonia, a chemical widely used in industry and in agriculture. It will be the first ammonia plant in the country to draw its raw materials exclusively from coal chemicals. Spokesmen for the company explained that Alabama By-Products Corp. has been exploring this project for some time in an effort to improve utilization of the chemicals extracted from coal during carbonization at the company's operation in Tarrant. The plant will be independent of long, natural-gas pipe lines, the company points out. Despite the large demand for ammonia in the Southeast, there is no commercial production east of Memphis, Vicksburg and New Orleans on the Mississippi and south of Virginia. Agricultural and industrial consumers in the area are expected to benefit from this plant through lower transportation costs and improved source of supply.



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BCR Marks Year's Advances

Nineteenth annual meeting reviews past accomplishments and stakes out future projects — First Techno-Sales Conference pinpoints market research as key to integration of technical studies and coal sales.

RESEARCH AND DEVELOPMENT leading to broader markets for coal was the theme as Bituminous Coal Research, Inc., staged its 19th annual meeting March 24 at Columbus, Ohio. Featuring the day-long meeting were dedication of the first industry-owned coal research laboratory and presentation to J. B. Morrow, past president of BCR and now consultant, Alford, Morrow & Associates, of the second annual BCR award for leadership in behalf of industry-sponsored coal research.

The BCR meeting was preceded, on March 23, by the first BCR Techno-Sales Conference for engineering and sales representatives of member companies.

In both meetings, spokesmen reviewed accomplishments thus far in research and development, reported on work in progress, discussed immediate and future needs and sought ways to bring the benefits of research to coal producers, shippers, and industrial, commercial and residential customers.

Following are highlights of reports and addresses made at the two meetings:

BCR MEETING

Bird's-eye view of achievements, Dr. A. A. Potter, president, BCR—In the past year, BCR has moved into the new research laboratory, providing floor area of 12,411 sq ft; cooperated in organization of Automatic Solid Fuels Equipment, Inc., and in other ways brought producers and retailers closer together; set up BCR Products, Inc., to promote BCR developments; and cooperated with electric utilities in joint fuel studies. In addition, BCR has demonstrated the efficiency of coal-fired crop dryers, satisfactory operation of a diesel engine on producer gas from coal, the economy of the electric furnace for making low-carbon steels, economical uses for flyash, usefulness of mining byproducts for lightweight aggregates, and the dependability of coal as a source of chemicals.

BCR also has proved the usefulness of bulletins, operating manuals, industry aids and combustion clinics in helping small power plants and commercial and industrial users and has built confidence in the progressive spirit of the industry. All this is being done on a current income of some $400,000 per year, representing an assessment of ¼c per ton on less than one-third of the industry's total production. In other words, whereas other industries spend from ½ to 12% of gross income for research, bituminous spends less than 1/50 of 1% in research through BCR. The industry's future needs better protection through stronger support of its research agency.

Industrial and electric-utility uses, E. R. Kaiser, associate director of research, BCR—Installation of overfire air jets on steam vessels plying the Great Lakes has cut the smoke nuisance and saved a 3,000,000-ton-per-year market for coal. Research now is under way to measure the effectiveness of water sprays in minimizing soot and cinder emission from stacks of industrial steam plants. Reduction of cinders from spreader stokers also is receiving careful attention. To help electric utilities abolish emission of sulphur dioxide from stacks, a laboratory-scale method of converting it to sulphur trioxide, which can be removed easily, is being studied. Informal working arrangements now are in effect between BCR on the one hand and, on the other, manufacturers of dust collectors and the Air Pollution Control Association. In addition, since January, 1953, BCR has sponsored 29 combustion conferences on such matters as smoke and dust abatement, mechanical coal- and ash-handling, and economical plant operation.

On the side of coal utilization, the search is on for a stoker-boiler combination that will compete with "package" units now sold for oil and gas. Meanwhile, in behalf of diesel-engine and gas-turbine manufacturers and associated interests, data have been evolved on gas producers. Finally, a member of the staff of BCR's Locomotive Development Committee is studying possible applications of a stationary coal-fired gas-turbine generator for ships, mine power and industrial power where cooling water is not available.

Residential, agricultural and small commercial markets, J. R. Garvey, supervising engineer, BCR—Over 200 BCR-developed handfired smokeless heaters now are in service in Tennessee and a Canadian manufacturer, having sold several hundred, is producing them under license. Meanwhile, the BCR warm-air furnace, which incorporates the same principle of design, has become the first handfired residential furnace using high-volatile fuel to be approved by the Allegheny County Bureau of Smoke Control. BCR also has tested and improved the Campbell stoker, now approaching assembly-line production. Field trials have proved the efficiency and economy of the BCR crop dryer and of a heater for large central chicken brooders. In the small commercial market, coal will be helped not so much by entirely new-type equipment as by improvement and adaptation of existing equipment—for example, the Fire Jet burner, which originally was developed for anthracite.

Market research John W. Igoe, director of information, BCR—Market research is the planned collection, correlation and interpretation of information about a specific subject affecting marketing on which an executive must make decisions. Market research reduces the risk of executive decisions. General Motors has made advances in design and merchandising by painstaking search to find out consumers' wants and Aluminum Co. of America and Minnesota Mining & Mfg. Co. have grown by developing new products and new uses for commodities. BCR is attempting to move along the same lines in the selection of new projects and in the development of new processes and products. Market research guided BCR's recent study of electric o open-hearth furnaces for making steel and revealed a potential of 25,000,000 tons of coal per year. Research in the possible use of flyash for highways and concrete construction has turned up a big potential market and thus has shown electric utilities a profitable outlet for an otherwise costly nuisance. BCR will continue its efforts to coordinate market research with its technical research to build future markets for coal.

Role of research in coal and electric power, J. A. Hutcheson, vice president, Westinghouse Electric Corp.—Several provocative questions emerge from a consideration of coal's competitive position: Since other fuels are easier to transport,

(*Continued on p 188*)

J. B. MORROW

Mr. Morrow, past president of BCR, was presented the annual BCR award at the luncheon meeting March 24. The award, now in its second year, is given for "exemplary achievements in promoting coal-research support, utilizing BCR research results to expand markets or otherwise contributing to the progress of the coal industry through a BCR activity."

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STANDARD

Mining, Preparation and Safety Keynote Indiana Institute Meeting

FACE PREPARATION AND SAFETY—Albert Jones (left), E. I. du Pont de Nemours & Co., Inc.; Carl Donie, Fairview Collieries Corp.; J. W. Anstead, Linton-Summit Coal Co.; E. E. Quenon, U. S. Bureau of Mines; and A. G. Gossard, Snow Hill Coal Corp.

COAL CLEANING, ELECTRICAL PROTECTION, CABLE BELTS—E. H. Fallon (left), Hewitt-Robins, Inc.; J. H. Nash, Ensign Electric & Mfg. Co.; J. R. Wilson, Green Valley mine, Snow Hill Coal Corp., and Max Tuttle, Enos Coal Mining Co.

INDIANA INSTITUTE OFFICIALS—J. W. Anstead (left), general manager, Linton-Summit Coal Co., institute president; John Stachura, general superintendent, Enoco Collieries, Inc., third vice president; C. B. Burk, mining engineer, Viking Coal Corp., member executive board; Alva Harris, general manager, Ingle Coal Corp., second vice president; Harry Cruikshank, Viking Coal Corp., first vice president; and Joseph Berta, superintendent, Victory mine, Truax-Traer Coal Co., member executive board.

CHEMICAL coal-breaking, preparation, safety, protective devices for electrical equipment, and cable belt conveyors were the subjects discussed at the spring meeting of the Indiana Coal Mining Institute, held April 10 at the Hotel Deming, Terre Haute, Ind., with over 150 members and guests in attendance.

Presiding officer at the morning and afternoon sessions was J. W. Anstead, general manager, Linton Summit Coal Co., and president of the institute. Speaker at the banquet was H. D. McGinnis, explosive engineer, E. I. du Pont de Nemours & Co., Inc.

Institute officers are: president, Mr. Anstead; first vice president, Harry Cruikshank, Viking Coal Corp., Terre Haute, Ind.; second vice president, Alva Harris, general manager, Ingle Coal Corp, Elberfeld, Ind.; third vice president, John Stachura, general superintendent, Enoco Collieries, Inc., Bruceville, Ind. Members of the executive board include: Placide Mayeur, Princeton Mining Co.; Colvin Burk, Viking Coal Corp.; V. S. Meister, retired, Jeffrey Mfg. Co.; L. S. Ahlen, Goodman Mfg. Co.; A. G. Gossard, Snow Hill Coal Corp.; Carl Donie, Fairview Collieries Corp.; and Joseph Berta, Truax-Traer Coal Co.

CHEMICAL COAL BREAKING

"Face Preparation With Chemechol" was the subject of the first paper in the technical sessions, with Albert Jones, explosive engineer, E. I. du Pont de Nemours & Co., Inc., as the speaker. The process was described by Mr. Jones as a medium using three types of energy: electrical to initiate a chemical reaction building up gas pressure within a steel tube. When gas pressure builds up to about 20,000 psi, a steel disk is ruptured, releasing the gas to break the coal. The device consists of four main components.

1. A steel tube 54 in long and $2\frac{5}{16}$ in in diameter. Overall length with terminals is 63 in and the weight is about 35 lb.

2. The Chemechol unit, about $1\frac{1}{2}$ lb of chemical mixture packed in a cylindrical paper shell about 1 in in diameter and 40 in long. Gases produced by the unit consist of about 60% steam, with the remainder a mixture of nitrogen and carbon dioxide. Units are packed in fiber containers as ordinary chemicals and only two precautions should be observed in on-the-job storage: the storage area should be clean and dry and the units should be protected from damage by heavy objects and from contamination by such materials as oil and grease.

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

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52-ton DARTS loaded by 3½ yd. Northwest 80-D

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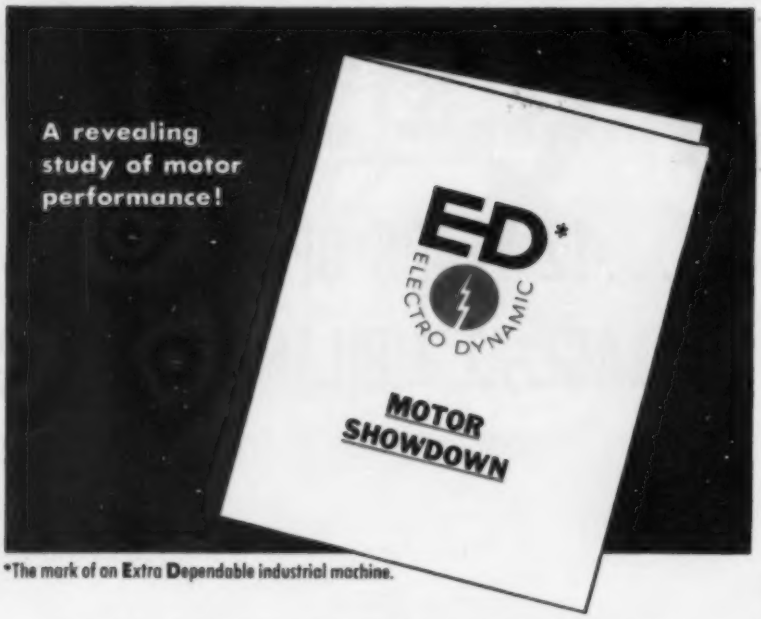

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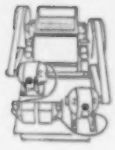

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3. The battery controller which furnishes and controls the electric current which starts the chemical reaction through a nichrome wire embedded in the chemical mixture. A current of about 8 amp applied for 7 sec is required to start and complete the reaction.

4. A No. 12 plastic-covered stranded cable to conduct the current to the breaking unit.

Chemechol was approved as permissible by the U. S. Bureau of Mines April 20, 1953, Mr. Jones reported, and in the last 9 mo of 1953 was used to break down approximately 550,000 tons of coal in four Illinois mines. Cost was only slightly higher than explosives would have been, and Chemechol, Mr. Jones declared, produces fewer fines without oversize lump, is nonexplosive, and will not detonate if subjected to heat, electricity or pressure.

In citing Chemechol results at the Fairview Collieries Corp., Mr. Donie explained that his company went to the new medium in an effort to reduce roof falls and get better coal breakage. The mine went completely to Chemechol in February, 1954, and breaking cost has been comparable to explosives. However, it was necessary to add another man to the face crew and this increased labor cost about 3c per ton, Mr. Donie continued. Benefits from Chemechol have so far outweighed the increase in breaking cost and include:

1. A 31% decrease in the quantity of carbon produced at the face.
2. A 200% increase in the yield of 6x4.
3. A 7% decrease in 4x1½.
4. Less drilling per cut of coal.
5. Greater safety.
6. Improved roof conditions.
7. A decrease in tipple rejects of from 25 to 16%, with even-better results expected in the future.

There have been some minor complaints about fumes and dust, both these are not serious, Mr. Donie concluded.

SAFETY IN MINING

"Lest we forget" were the key words in an analysis of past mine disasters by E. E. Quenon, chief, Vincennes-area office, Accident Prevention and Health Div., U. S. Bureau of Mines. He based his comments on movies, slides and maps and emphasized that fire is the biggest potential hazard in a coal mine.

"Why SAFETY Pays" was the theme stressed by Mr. Gossard, Snow Hill vice president and general manager, who set the stage for his discussion by pointing out that a $10,000 compensation award is poor payment for a man's life and is only a token recompense for the loss of earnings that the man otherwise would have received had he been able to work.

'Quoting' E. F. Carry, president, the Pullman Co., to the effect that "Safety pays dividends in human happiness and industrial efficiency," Mr. Gossard stated that he knew of two companies that used safety to avoid what might have been bankruptcy. One Pennsylvania company with 12 mines doubled tons per accident while increasing tons per man 40%. An-

H&L teeth that really dig!

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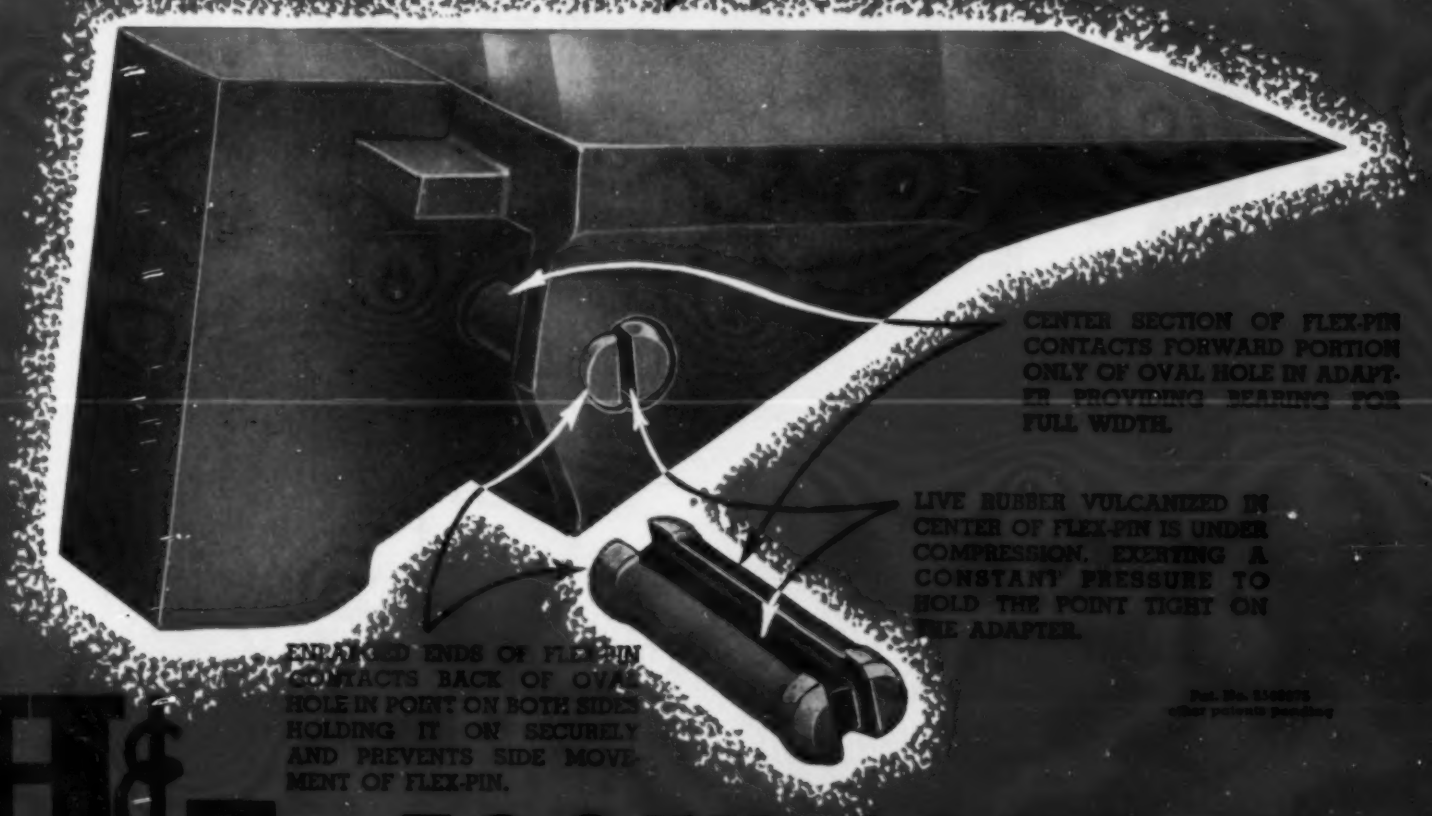
THE *Positive Locking* FLEX-PIN CONNECTION


CENTER SECTION OF FLEX-PIN CONTACTS FORWARD PORTION ONLY OF OVAL HOLE IN ADAPTER PROVIDING BEARING FOR FULL WIDTH.
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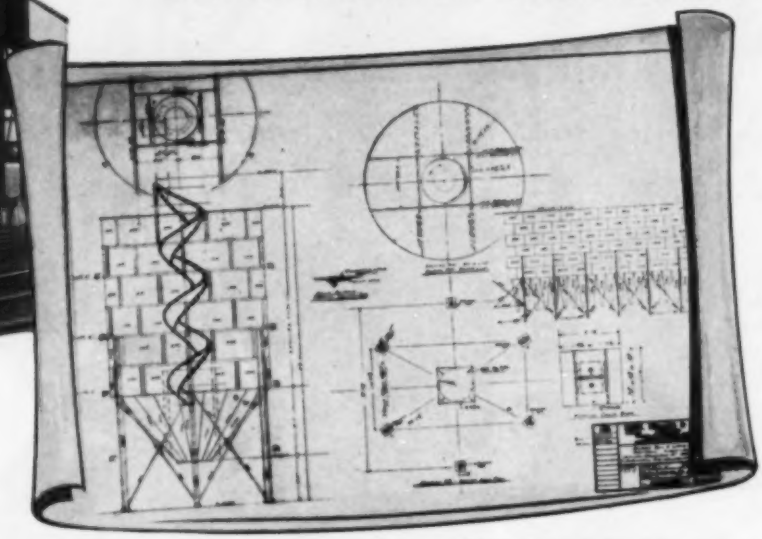

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- No droppage to degrade your coal
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- Costs nothing to operate (gravity operated)

Robert Holmes Lowering Spirals are designed to lower material through the use of centrifugal force, thus eliminating the need of an inside retaining lip. Each spiral is formed like a well-banked race track. The coal automatically slows down when it reaches the "safe" speed limit, regardless of the distance of travel.

As there is no retaining lip, the coal slides gently off onto the peak of the pile to form a natural angle of repose. In this way, the coal is spread out uniformly . . . a real advantage where segregation is a problem.

Lowering spirals are essential to proper handling in surge bins, run-of-mine storage bins and pockets, mine retail sales bins, and consumer storage systems.

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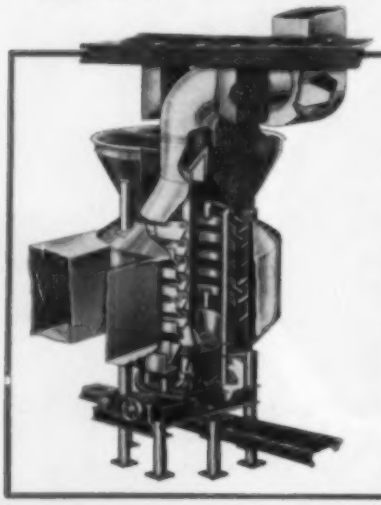

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EQUIPMENT APPROVALS

Five approvals of permissible equipment were issued by the U. S. Bureau of Mines in March, as follows:

Goodman Mfg. Co.—Type 580-42 cable-reel shuttle car; three 10-hp motors, 250 v, DC; Approval 2-986; Mar. 4.

Goodman Mfg. Co.—Type 581-42 cable-reel shuttle car; three 10-hp motors, 250 v, DC; Approval 2-987; Mar. 4.

Joy Mfg. Co.—Type RBD11 drilling machine; 26-hp motor, 250 and 500 v, DC; Approvals 2-988 and 2-988A; Mar. 8.

Jeffrey Mfg. Co.—Power unit for conveyor; 100-hp motor, 380 v, AC; Approval 2-989A; Mar. 16.

Marietta Mfg. Co.—Marietta continuous miner, 5-ft model; one 70-hp and one 25-hp motor, 230 v, DC; Approval 2-990; Mar. 17.

other mine reduced disabling injuries from 86 in 1946 to 7 in 1951 while increasing efficiency 50%.

A 20% reduction in accidents can result in a cash saving of $2,000 a month in compensation, or about 2c per ton of coal at most Indiana mines. Noninsurable accident costs, such as, wasted material, damaged equipment and production delays, are estimated by some insurance companies at four times the insurable loss.

In an effort to improve safety in Indiana, a campaign for 100% training in the USBM Accident-Prevention Course has been initiated and the Indiana Joint Committee for Coal-Mine Safety has been formed. Another safety incentive is the Turkey Race sponsored by the Lynch Coal Operators' Reciprocal Association through which the mine with the least number of days lost per 1,000 tons of coal produced will receive Christmas turkeys for all employees, and any mine producing over 50,000 tons per compensable accident will receive hams for all men. Mr. Gossard emphasized that any company not using this incentive was missing a good bet. He concluded with the statement that top management realizes the value of organized safety campaigns and is giving them its active support.

CLEAN-COAL RESPONSIBILITY

"The Foreman's Responsibility Toward Cleaning Coal" was the subject of a paper by Max Tuttle, combustion engineer, Enos Coal Mining Co., Indianapolis, Ind. In addition to being a master of many trades, the foreman, Mr. Tuttle observed, must be prepared to make an ever-changing variety of products from a raw material of an unknown analysis. Highly automatic and efficient boiler and combustion-control systems have created an apparent need for ultra preparation. As a result, coal companies have to supply the type of product that will give in-

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stantaneous response in burning equipment using metering-type regulation, Mr. Tuttle explained.

Rather than selling coal with 8% ash and 13,000 btu, a coal with 10% ash and between 12,000 and 13,000 btu could be offered to the customer at a somewhat lower price and without the complications in preparation that would otherwise be necessary. However, there may be some complaints about the increase in ash. Other problems facing the preparation foreman include handling refuse, wet coal, fine-coal dewatering losses and blending, Mr. Tuttle added.

In discussing the foreman's responsibility, John Wilson, preparation engineer, Green Valley mine, Snow Hill Coal Corp., Terre Haute, Ind., observed that the plant foreman can contribute to more-efficient operation by developing more-economical methods. He must seek new materials, must watch the quality of the cleaned product and must keep his eye on the refuse to prevent coal waste. A foreman must always ask himself if the job is being done correctly, decide whether a spare unit will help maintenance and, in some instances, ask himself whether the unit is needed at all. And finally he must ask whether the plant is an efficient, economical unit.

ELECTRICAL PROTECTION

Unless an electrical circuit is protected against overloads it will be burned up by heat, explained James Nash, electrical engineer, Ensign Electric & Mfg. Co., Huntington, W. Va., in opening his discussion of "Protective Devices for Electrical Equipment." A distribution box serves as a source of power and the main trip provides short-circuit protection for cables and machine motors. Protection for men and equipment is provided by a ground limiter which can do an excellent job if properly applied.

Fuses are not satisfactory protective units, Mr. Nash declared, and while magnetic contactors are ideal, they are expensive, heavy and hard to move. Circuit breakers are portable, compact, adjustable and have ground trips, and therefore are the most-desirable protective units. To meet the needs of users, an easily converted lever-action plug has been developed to connect cables to protective devices. All parts are easily replaced to facilitate maintenance, and terminals can be put in with a screw driver. Plugs can carry a 300% overload and a shunt trip opens the circuit breaker if the plug is opened, Mr. Nash stated.

CABLE BELTS

In presenting a film on cable belt conveyors, E. H. Fallon, Robins Conveyors Div., Hewitt-Robins, Inc., Chicago, pointed out that such conveyors are being used successfully in England and that interest has been shown in this country. Cost of the unit is about 20% less than a conventional belt, and power requirements are around 50% less. A 42-in cable unit, traveling 550 fpm while carrying 1,000 tph a distance of 5 mi requires 800 hp. A conventional belt would need 1,500 hp for the same service, Mr. Fallon declared.

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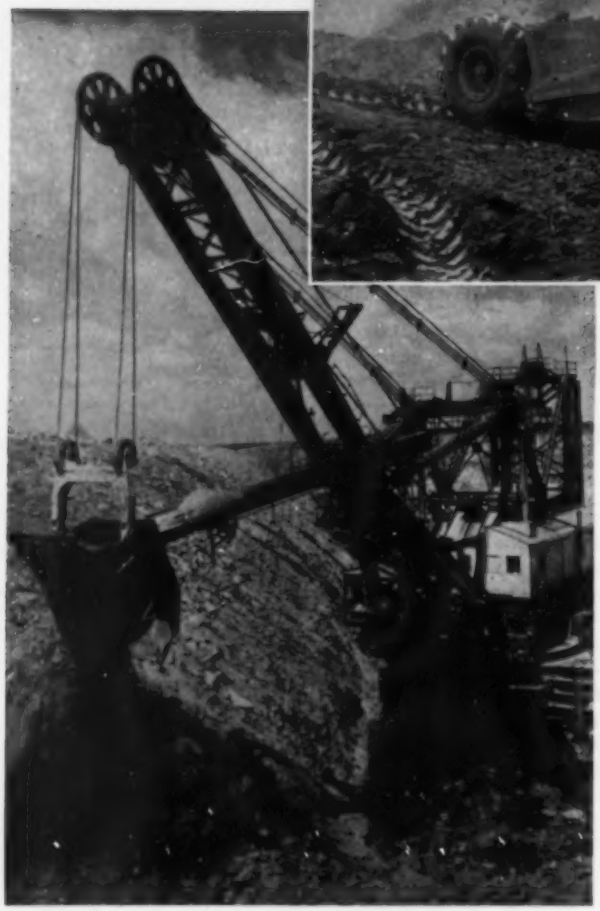

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Power Meet Scans Fuels Future

ELECTRIC-UTILITY EXECUTIVES, fuel and power engineers, related interests and researchers scanned power and fuel needs for the future in a 3-day meeting of the American Power Conference at Chicago, March 24-26.

Papers presented at the conference that bear directly or indirectly on coal are briefly summarized below:

Fuel demand and supply—Coal producers and customers in electric power must work together to plan future coal needs, said George A. Lamb, manager of business surveys, Pittsburgh Consolidation Coal Co. The key to adequate coal supplies lies in joint planning as far ahead as 10 yr to minimize the danger of too little mining capacity. The growing power market will put increasing demands on coal, but no extraordinary demands in the immediate years.

If postwar trends continue, natural gas may surpass coal within 5 yr and in time even challenge oil for supremacy as our leading source of energy, said R. J. Gonzalez, Humble Oil & Refining Co. Use of gas by electric utilities nearly tripled from 1945 to 1953. Price is one reason for this growth. At 7c per million Btu at the well, gas costs only 35% as much as bituminous at the mine and only 16% as much as crude oil. But strong demand for gas will press prices upward, since present prices of coal and oil plus other factors indicate that field prices of about 20c per Mcf for gas will be needed to balance supply and demand among the three leading fuels.

Because much of oil's growth has occurred in new markets where coal is not competitive, coal has not lost as much to oil as might first appear, said C. J. Hedlund, Standard Oil Co. (N. J.) In electric power, coal is the dominant fuel, followed in order by gas, hydro and oil. Yet oil still is important in power generation because it supplies such areas as Florida, New England, California and the Southwest, where coal and gas are not readily available. There is no reason to expect any shortage of heavy fuel oil unless artificial restrictions on supply are imposed by legislation limiting imports of residual fuel oil, which provide nearly one-fourth of total heavy fuel oil supplies in the United States.

Nuclear power—Atomic plants for making electric power may be useful in specialized applications but will cause no revolution in the power industry in the foreseeable future, according to D. H. Loughridge, Northwestern Technological Institute. Because of cheap fuel and water power, no more than 3% of the total cost of power generation in the past 50 yr has gone for fuel and energy expense. There are few sites in the United States where atomic power can compete with fossil-fuel or hydro power but in remote military stations and in other continents where fossil fuels and water are not available, atomic power might be economical.

The cost of fissionable Uranium-235 appears to be between $4,500 and $9,000 per pound at present, compared with a price of about $35 per pound for natural uranium or U-238, which contains only 1/140th of fissionable U-235, said W. F. Friend, Ebasco Services, Inc. Taking the latter figure of $35, fuel cost in a thermal reactor producing electric power would be 3.23 mills per kilowatt-hour; in a regenerative reactor, 1.13 mill; in a breeder reactor, 0.02 mill. These figures compare with about 2.7 mills in a modern coal-burning plant with 12,500-Btu coal at $7 per ton.

Two major problems—investment and operating costs and revenue from sale of fissionable products—must be solved favorably before any company can go into production of nuclear power, according to R. L. Doan, manager, Atomic Energy Div., Phillips Petroleum Co. To compete with conventional power, nuclear power must be produced in a plant the entire cost of which, including reactor, does

State Chief Presents Safety Program at Institute

Frank B. King, new chief of the West Virginia Department of Mines, and four of his associates presented a program at an evening meeting of the Kanawha Valley Mining Institute, Montgomery, W. Va., April 9. Mr. King spoke on the department's aims in mine safety, services available to the coal industry and plans for reviving the state-wide mine safety meet, the first of which is scheduled for about October, and then introduced other members of the department's organization.

Bernice Booker, state director of accident prevention, assisted by Robert McCormick, safety inspector, demonstrated an M.S.A. Chemox self-generating breathing apparatus. The demonstration of the apparatus providing for a minimum of 45 min protection in unbreathable air included both the standard face piece and one for attaching a life-line telephone. The Mines Department owns 30 of the units, stationed in groups of five at strategic points.

Roy Lee Graham, director of mine rescue and safety, demonstrated the M.S.A. Pneolator, a suitcase-sized apparatus which automatically carries out artificial respiration and by the simple loosening of a cap is converted to an inhalator. The department has one of these at headquarters in Charleston and one each at five strategic locations.

Macle Kuhn, maintenance man for state apparatus, demonstrated a M.S.A. McCaa-type 2-hr oxygen-breathing apparatus during the evening's program.

Officers, past presidents (indicated by •) and the principal speaker at the April 9 meeting shown in the photo above are: Seated—Frank B. King (left), chief, West Virginia Department of Mines, meeting speaker; F. E. Burger•, superintendent, Alloy No. 2 mine, Electro Metallurgical Co.; C. R. Stahl•, consulting engineer; W. B. Deveny, comptroller, Cannelton Coal & Coke Co., and president of the institute; and Carel Robinson•, consulting engineer. Second row—R. F. Overly• (left), superintendent, Christian Colliery Co.; Rush Meadows•, president, Med-Mar Coal Co.; R. S. Long•, president, Riverton Coal Co.; Wm. Buchannon, cashier, Montgomery National Bank, and treasurer of the institute; C. V. Hunt, general superintendent, Semet-Solvay Div., Allied Chemical & Dye Corp., third vice president of the institute; H. H. Jones, general superintendent, Carbon Fuel Co., first vice president of the institute; and W. F. Wolfe•, vice president, Warner Collieries Co. Back row—O. G. Stewart•, Electro Metallurgical Co.; Alan H. McBane•, superintendent, Ward mines, Valley Camp Coal Co.; Joe Mulligan•, safety director, Semet-Solvay Div.; John Willis Jr.•, vice president and chief engineer, Coalburg-Kanawha Coal Co.; M. R. Alley, general manager, Gauley Mountain Coal Co., second vice president of the institute; and Maj. A. W. Fluegel•, secretary of the institute.

not exceed $200 per kilowatt of capacity. Cost of delivery power must not exceed 5 mills per kilowatt-hour. Though most proposals run considerably higher, there is at least one design that now seems to meet these figures.

Flyash disposal—Electric utilities today are collecting over 6,000,000 tons of flyash from pulverized-coal burning units and will collect nearly 17,000,000 tons in 1963, according to C. M. Weinheimer, Detroit Edison Co. The disposal problem is acute, especially since disposal costs between 14½c and $1.50 per ton, depending on the circumstances. Though extensive markets for flyash have been developed, the predicted rate of increase in tonnage collected appears to be greater than the rate of growth of developed markets. Of all markets available, the lightweight masonry-unit industry appears to be the most promising outlet.

Electric power for air conditioning—In the 10 yr from 1940 to 1950, the air-conditioning horsepower load increased more than 400%, from 165,000 to 833,000 hp, said J. R. Hertzler and V. T. Kartorie, York Corp. The 1952 increase over 1950, from 833,000 to 1,036,000 hp, was about 24%. In this tremendous growth, residential cooling units are playing an increasingly large role. Manufacturers expect annual sales of residential air-conditioning equipment to total 2,000,000 room units and 500,000 year-round whole-house units. Potential annual electric load for sales of this magnitude, assuming 1,000 hr operation for each unit, would total 3,500,000,000 kw-hr for the Nation. Naturally, this load would not be divided equally among all regions. Utilities (and coal producers) must analyze the data regionally to determine market potentials.

Electric utility growth—In 1952, the utility industry installed 6,800,000 kw of new capacity and in 1953, 10,000,000 kw, said W. H. Sammis, Ohio Edison Co. For 1954, there are scheduled additions of 14,500,000 kw; for 1955, 11,300,000 kw. Trends pointing to a still better future for the electric power industry include the following: (1) in the last 30 yr, electric power use in manufacturing has grown from 1.6 to 7 kw-hr per man-hour; (2) in 1940, the average farm in the eastern half of the Nation used 1,000 kw-hr; in 1953, 3,100 kw-hr; within the next few years, about 6,000 kw-hr; (3) between 1932 and 1953, average price dropped from 5.6 to 2.74c per kilowatt-hour; (4) the best plant today produces 1 kw-hr from 9,200 Btu; on the drawing boards now is a plant that will produce 1 kw-hr from only 8,400 Btu; (5) pressures, temperatures and capacity of generating units are fast growing higher; (6) transmission lines now carry up to 300,000 v; and (7) the utilities, though relying still on fossil fuels, are searching for new energy sources such as atomic fission.

Electric furnaces for steel—Capital costs of an electric furnace run only about 60% of the cost of an open-hearth furnace of similar size, and operating and maintenance costs (exclusive of energy) for the electric furnace total about $1.10 to 77c lower, said D. D. Moore, Battelle Memorial Institute. But with 9-mill power and fuel oil at 60c per million Btu, energy costs for the electric furnace are higher by some $4 per ton of ingot. Barring development of more economical practice, total electric-furnace capacity might reach 20- to 25,000,000 tons by 1965. If this should occur, and if average demand of 500 kw-hr per ton of ingot should hold constant, about 1,400,000 kw of new generating capacity would be needed now to meet the requirements.

Growth of Tennesse Valley Authority—Hydro will continue to play a role in development of TVA but the available hydro sites remaining will accommodate only small installations, reported C. E. Blee and H. J. Peterson, TVA. TVA's major growth therefore must be in steam capacity. At the end of 1956, steam capacity of the system will be 6,287,000 kw, or 63% of total generating capacity.

Lubrication Engineers Canvass Mining-Machinery Problems

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

A SPECIAL PANEL of experts discussed "Lubrication Application Problems and Their Solution in the Coal Industry" at a session of the American Society of Lubrication Engineers' Annual Meeting and Exhibit held in Cincinnati, April 5-7.

Chairman of the session held Tuesday morning, April 6, was G. R. Spindler, director, School of Mines, University of West Virginia, Morgantown, W. Va. Representing the coal industry was W. R. Wood, electrical superintendent, The Berwind-White Coal Mining Co., Windber, Pa. Representing coal-machinery builders were J. J. Slomer, Goodman Mfg. Co., Chicago; and G. C. Delmaso, products engineer, Joy Mfg. Co., Franklin, Pa. Representing the petroleum industry were F. C. Robert, lubrication engineer, Gulf Oil Corp., Library, Pa.; and C. J. Moser, lubrication engineer, The Texas Co., Charleston, W. Va.

In setting the stage for the panel discussion, Mr. Spindler pointed out that the mining industry is faced with the problems of rising labor costs and decreasing realization. More higher-capacity and more complex machinery has been introduced over the past decade and emphasis has been placed on preventive maintenance in an effort to increase machine output and lower costs. Mr. Spindler emphasized that preventive maintenance begins with good lubrication methods.

Speaking for the coal operators, Mr. Wood led off the panel discussion by stressing the adverse atmospheric conditions, such as dust and moisture, under which mine machinery must operate. Dirt and water frequently contaminate lubricants, causing lubrication trouble.

To get good lubrication, Mr. Wood outlined the following six points:

1. Use as few different grades of lubricants as possible.

2. Choose the best quality lubricant for each apolication as far as practicable.

3. Achieve simplicity of variety of lubricants.

4. Avoid, wherever possible, lubricants that resemble each other in colors.

5. Establish regular lubrication practice.

6. Eliminate contamination of lubricants.

In conclusion, Mr. Wood explained that a successful lubrication program depends upon putting the proper quantity of lubricant in the proper place at the proper time and keeping it clean.

Speaking for the equipment manufacturers, Mr. Slomer explained that early-model shortwall cutting machines sold for $2,500 and had to be lubricated every 20 min with black oil and cup grease, whereas a modern continuous miner approaches $100,000 in cost and holds a barrel of oil. Design efforts have been devoted to making enclosed lubrication compartments for gears and the like wherever possible, Mr. Slomer added.

Correct lubrication begins on the drawing board, Mr. Slomer said, and designers try to incorporate methods that will require a minimum of effort by the machine operator. Helpful information, including lubrication charts, is given to the purchaser of equipment and only four types of greases usually are specified in an effort to make lubrication as easy as possible.

In speaking further from the manufacturer's viewpoint, Mr. Delmaso said that mechanization and particularly application of hydraulic power have brought on lubrication problems. Many of these have been solved by development of new valves, hoses, cylinders and so on. Many errors have been made by trying to use hydraulic oil for other purposes and misusing other types of lubricants, Mr. Delmaso added.

Oxidation of lubricant can cause trouble in a hydraulic system and should be guarded against as much as possible. Presence of air in the hydraulic oil and high oil temperature are largely responsible for oxidation. To prevent trouble resulting from oxidation, systematic flushing and draining of hydraulic systems should be practiced, Mr. Delmaso explained.

Lubrication problems can be solved by cooperation between mining-equipment manufacturers, lubrication-equipment manufacturers, oil companies and coal companies, Mr. Robert declared in dis-

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cussing lubrication from the oil company viewpoint. Equipment manufacturers should build machines with lubrication in mind and should use a centralized system if possible. The types of lubricants required for machines should be kept to a minimum, especially for face equipment.

Lubrication equipment should be designed to fit a coal mine, Mr. Robert continued, and there is a great need for small, lightweight units for carrying and dispensing oils and greases in thin coal. Electric grease guns also have great merit and should not be overlooked when seeking better lubrication methods.

Oil companies can help solve lubrication problems by improving their lubricants and keeping the needs of coal companies in mind. Coal companies can help the oil companies do a better job by giving lubrication engineers an opportunity to specify lubricants for any new machine before it goes into the mine, Mr. Robert said.

Mine management can assist in getting good lubrication by providing for the proper lubrication of new equipment. A good oil house and method of handling lubricants, suitable lubrication equipment and good, dependable lubrication workers are heavy contributors to successful lubrication. By cooperation between mine managers and oil suppliers, good lubrication is possible, Mr. Robert concluded.

The simplification of lubrication desired by coal companies presents a problem to oil companies because all oil companies do not recommend the same types, Mr. Moser explained. Three of the most difficult lubrication problems in the coal industry are proper selection of lubricants, lubrication of preparation plants, and storage and handling lubricants in and about the mine, Mr. Moser added.

Following the introductory remarks by panel members, the following questions from the audience were answered by panel members:

Q: Why are not non-flammable hydraulic oils used in mining machinery?

Mr. Slomer: Primarily because of price. Cost per gallon varies from $2.50 to $50 per gallon, depending upon type. Some so-called non-flammable organic oils are flammable at high temperatures and generate noxious fumes which could be a hazard underground. Water-soluble glycols cause parts to wear faster.

Q: What are the difficulties encountered in using extreme-pressure-type grease in clutches?

Mr. Moser: Where clutches become overheated, undesirable deposits are formed on them.

Q: What kind of grease is best for electric motors?

Mr. Robert: A sodium-base grease.

Q: Why aren't sealed ball bearings more generally used?

Mr. Slomer: This is a designer's choice. Sometimes they have failed because of high operating temperature. New rubber-type bearing seals have been used successfully by the Joy Mfg. Co. in some applications.

Q: What type lubricant is best for skip ropes in wet conditions?

Mr. Moser: An inhibited-type product

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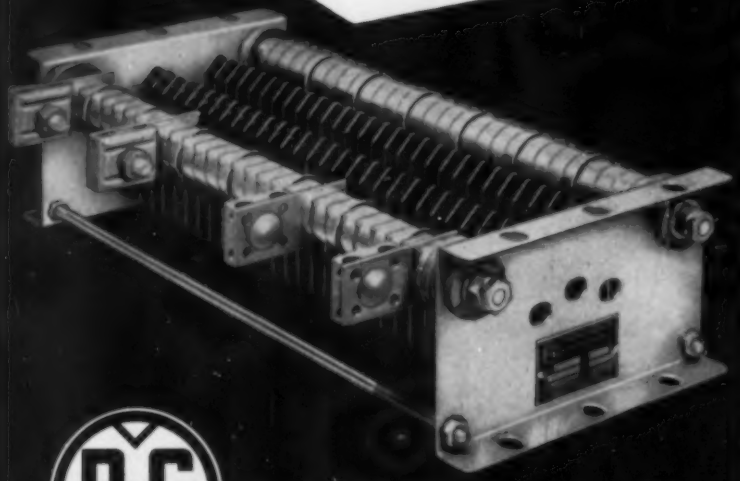

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which is fluid enough to penetrate to the core.

Mr. Robert: It depends somewhat on whether you are hoisting men or material. A man-hoist rope is required by law in some states to be replaced once a year, and it may not be necessary to lubricate it like a material-hoisting rope.

Q: Is there any practical non-flammable hydraulic oil?

Mr. Delmaso: While no one has gone to non-flammable type, the day when one is used may not be too far away.

Q: What is the proper type grease for tapered roller bearings on mine cars?

Mr. Wood: A lime-base grease, such as a No. 1 or No. 2 cup grease.

Q: Have you found it necessary to specify a special type grease for life-time prelubricated bearings?

Mr. Wood: We usually have had trouble in our mines after about 3 mo of service from this type of bearing and haven't standardized on them.

Q: Is it advisable to mix oils for use in mining machinery?

Mr. Delmaso: This just adds to the confusion and possibly could cause trouble.

Q: Are there any advantages with extreme-pressure lithium-base grease over extreme-pressure non-lithium-base grease?

Mr. Robert: It is a question of economics. The lithium-base grease is more expensive and the coal company must decide whether spending more money for the more expensive product is desirable.

Mr. Moser: As a gear oil, an extreme-pressure-type oil has some advantages, but we do not like to see it used in friction clutches. We have found that some lead-base types can be used in some places.

Q: Can I use SAE 70 oil for hydraulic oil?

Mr. Slomer: It depends on the circuit and whether it will pass through a filter. It also depends upon the length of line. We usually do not recommend this type of oil.

Q: What dictates the viscosity of hydraulic oil to be used?

Mr. Moser: We usually do not recommend anything heavier than an SAE 20 grade for vane-type pumps. For gear-type units a heavier type can be used.

Q: Why is it necessary to use expensive oils in hydraulic systems?

Mr. Slomer: The finishes on valves and pumps are very smooth and tolerances are very small, therefore, a better-grade lubricant is required to maintain the precision fit of the parts.

Q: How can grease and oil be kept clean in coal-mine atmosphere?

Mr. Wood: It can be kept clean, but seldom is. Lubricants should be pumped directly from the barrels to distributing containers. Mechanics should clean all fittings before adding new grease to equipment. Oil seals must be maintained to keep dirt out and breathers must be kept clean.

Q: What type of seals are most effective for ball and roller bearings on mine fans?

Mr. Robert: The pressure-relief type may be of some help.

Q: Will not a special lubrication crew

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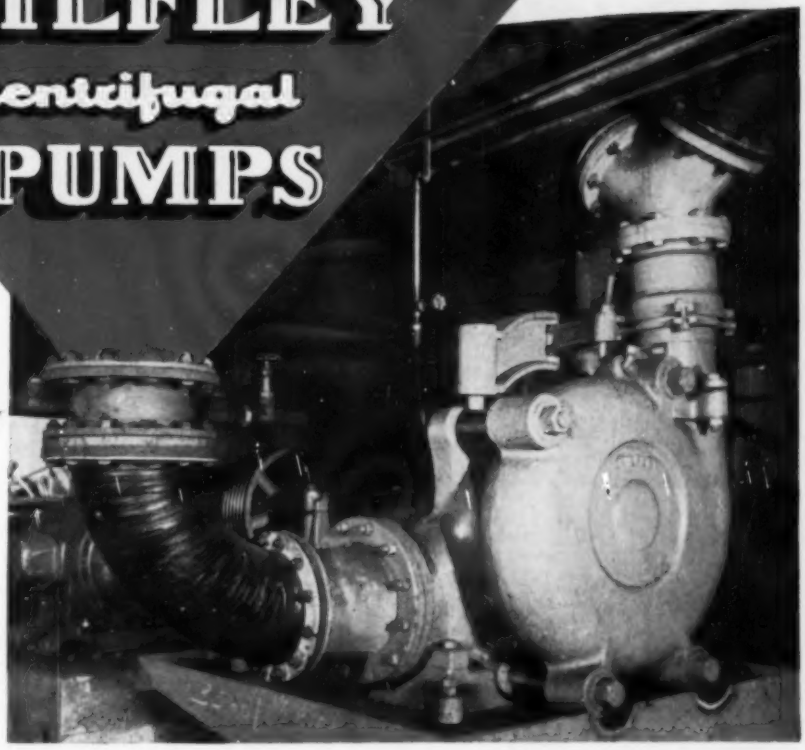

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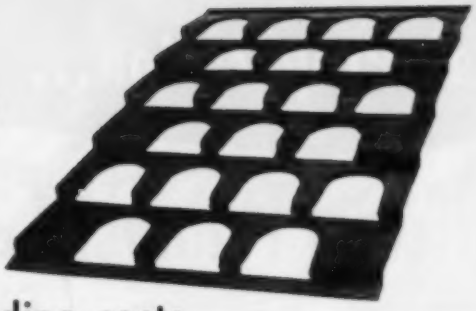


through blinding costs . . .

use Hendrick flanged lip screen

Costs caused by blinding on vibrating and shaking screens are an unnecessary drain on profit. By practically eliminating costly delays due to blinding, Hendrick Flanged Lip Screen can greatly help your profit picture.

Secret of Hendrick Flanged Lip Screens' success is their tapered shape of openings and steps that provide far better separation. Equally as ideal for shaking and gravity screens and discharge chutes, Hendrick Flanged Lip Screens are furnished with openings varying in size from .010 x .025 x ½" to 10½ x 11½ x 13". The screen shown above measures 60 x 96" — perforations are equivalent in screening size to 14" diameter holes. It is being successfully used to size block coal. For more details write Hendrick direct.

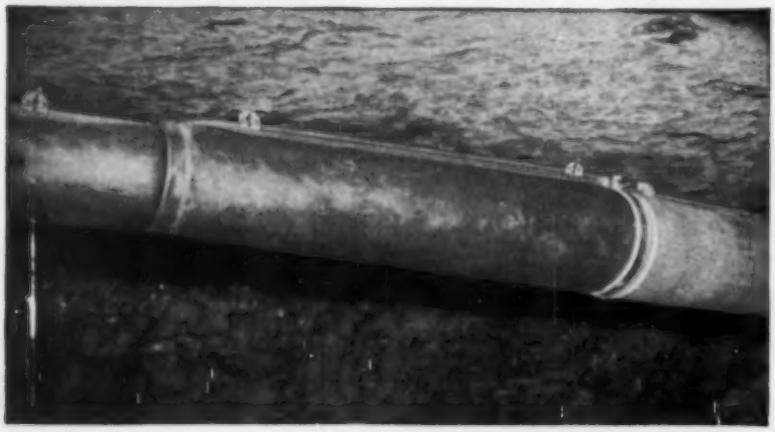
Hendrick
MANUFACTURING COMPANY

41 DUNDAFF ST., CARBONDALE, PA. • *Sales Offices in Principal Cities*

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

SPECIFY

FLEXIPIPE® the quality ventilating tubing



Flexipipe is now available with Rope Seam Suspension *at no additional cost.* The newest, best, quickest suspension . . . eliminates special accessories and suspension wires . . . *all you need is a nail.* It equalizes strain on the tubing.

Flexipipe is efficient, serviceable, economical. Jute and heavy-duty grades available in a variety of lengths and diameters to meet your requirements.

Write for complete information and sample.

Bemis Bro. Bag Co.

408-O Pine St.,
St. Louis 2, Mo.

be better than letting the machine operator handle the job?

Mr. Wood: We have a mechanic on each section who is responsible for that along with his other work and some companies have lubrication specialists who use special lubrication cars that are taken right to the equipment.

Q: What causes gummy material to collect on gear cases?

Mr. Wood: Breathing of the oil seal. As a warm machine cools, the air in the gear case contracts, internal air pressure decreases, and dirt works in through the seal as air enters the cool gear case. To prevent this, gear cases always should be kept full.

Q: What is viscosity and why are SAE numbers used?

Mr. Slomer: Viscosity is the time required for one liter of lubricant at a given temperature to flow through a measured orifice. The SAE numbers are used because it is easy for mine men to identify them.

Q: Can a unit cost per machine for lubricants be given?

Mr. Robert: Such figures usually are not disclosed by the companies.

Mr. Wood: The cost is variable and averages approximately $0.01 per ton for lubricants only. It may run as high as $0.025 per ton.

In concluding the panel discussion, Mr. Moser added that successful lubrication lies in the right lubricant in the right amount in the right place at the right time.

Subsidy to Spur Sales Of Anthracite Equipment

Cash refunds of up to half of the net factory cost of all approved anthracite heating equipment installed now are being offered to dealers handling Hudson and Hudson Sterling coal. The Equipment Subsidy Refund Plan, tagged "Operation Subsidy," marks The Hudson Coal Co. as the first producer to make available to its retailers a cash-refund plan to encourage sale of automatic and hand-fired equipment and Hudson Heat Regulators. Under the plan, the refund may not exceed 2% of the dealer's purchases of Hudson or Hudson Sterling coal. It is available for equipment purchased for installation during the current coal year. Retailers may use the funds to lower equipment costs, increase advertising or help pay for equipment service.

Preparation Facilities

Atkins Coal Co., Frackville, Pa.—Contract closed with Wilmot Engineering Co. for new anthracite preparation plant, including 1 4-ft Hydrotator for stove & nut coal; one Type D jig for pea coal; four 2½-ft.-diameter Hydrotators for buck No. 1, rice, barley and buck No. 4 coal; and one 6-ft classifier for buckwheat No. 5; feed capacity of plant, 125 tph.

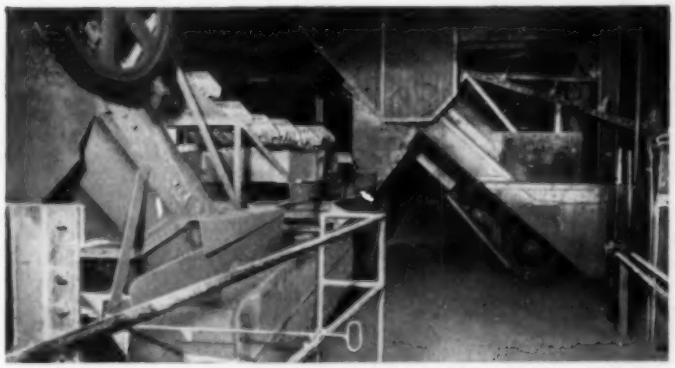
Drydock Coal Co., Nelsonville, Ohio—Contract closed with Fuel Process Co., and Industrial Engineering & Construction Co., Inc., for primary and middlings

Wilmot Preparation Equipment Selected for 'Job of the Year'

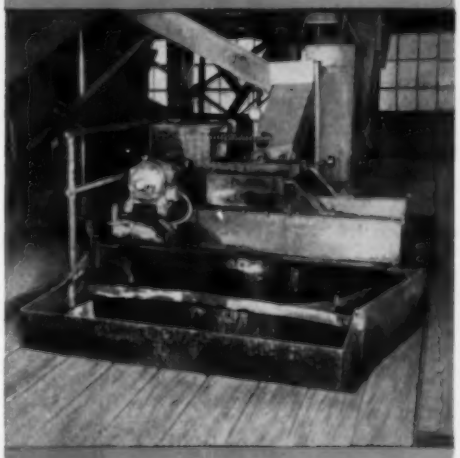
LEHIGH VALLEY COAL'S SWEEPING MODERNIZING PROGRAM MAKES WYOMING 'PUSH BUTTON' BREAKER

3 Wilmot Hydrotators, 2 Heavy-Density Units, and a Froth Classifier Achieve Exceptionally High Percentage of Feed Recovery and Low Costs. 4 Men Operate

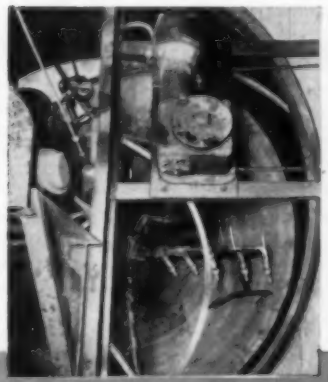
Most important improvement project of the last year in anthracite industry was Lehigh Valley's modernization of Wyoming breaker at Wilkes-Barre, Pa. Exhaustive studies of feed and market showed: (1) Need for completely new preparation equipment; (2) Wilmot equipment best met the requirements as to operating costs and recovery. 4 men operate the entire new preparation facilities at Wyoming.



Wilmot two-stage heavy-density system was adopted because Wyoming's feed has some recoverable middlings. Specific gravity of primary machine, at right, is set to float only pure coal; sp. gr. of secondary machine, left, to sink only pure refuse. In mid-picture "primary" is discharging middlings and refuse into feed chute of "secondary". Float of latter goes to crushers and thence back to feed circuit.



One of 3 Wilmot Hydrotators to clean rice, barley, No. 4 buck. In foreground, clean coal discharge. Beyond, feed well where feed meets rising currents and coal is floated to discharge over side of tank. Above, positive drive, holds speed of agitator constant. Vertical column (behind feed chute) houses electrode liquid-level control, part of Wilmot system for automatically controlling cleanliness of coal (float) and refuse (sink).



Left, looking down into Wilmot Froth Classifier installed for cleaning No. 5 buckwheat. Shows agitator, positive agitator drive, and power driven froth scrapers which skim froth and coal to clean coal discharge. Completely automatic, as are all other Wilmot units shown.

Send for Coal Cleaning Bulletins

WILMOT ENGINEERING CO.

HAZLETON, PA.
Plant:
WHITE HAVEN, PA.

How to get high-production, mechanized loading with very little investment...

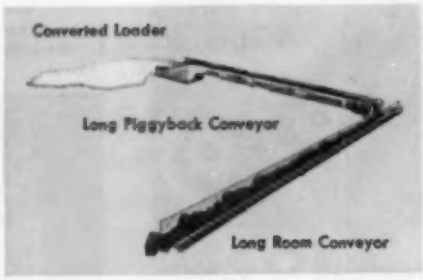
CONVERT your present outmoded equipment to

LONG PIGGYBACK® CONTINUOUS HAULAGE MINING

Here's how it's done!

1 **8 BU loader is converted for use with the Piggyback® Conveyor.** The conversion process includes lowering the overall height of the 8 BU to 31½", plus installing a short boom and wider loading head. Long will make this low-cost conversion or you can do it in your own shop. Also, conversions are available for the 12 BU, 14 BU and other popular mobile loading machines.

2 **Add a Long Piggyback Conveyor and Room Conveyor.** The Piggyback—operating as the connecting link between the loader and the room conveyor—takes coal out as fast as it is produced. No waiting for intermittent transportation.



3 **Resul.—a highly mechanized loading system** that assures greatly increased production and reduced operating costs, yet requires a very small equipment investment.

In case after case, this unique method of converting to Piggyback mining has enabled companies to greatly increase their production at surprisingly low investment cost. In fact, mines now using chain conveyors and shortwall cutting may only need to purchase the Piggybacks and the loader conversion for complete, high-production mechanization.

**Trade Mark*

For complete details, write us today.

The **LONG** Company
OAK HILL, W. VA.
Formerly Long Super Mine Car Co.

Belknap washers with additional equipment, to handle 5x⅜ at 150 tph.

Jamison Coal & Coke Co., Hostetter, Pa.—Contract closed with Industrial Engineering & Construction Co., Inc., for installation of plant addition of 16 Deister tables, handling ¼x0 at 160 tph.

Jones & Laughlin Steel Corp., Vesta plant, La Belle, Pa.—Shipment by Deister Concentrator Co. of one Concenco revolving feed distributor arranged for 12-way split feed distribution to No. 7 SuperDuty Diagonal-Deck coal-washing tables.

Clinchfield Coal Corp., Moss mine, Dante, Va.—Shipment by Deister Concentrator Co. of one Model 108-B Concenco revolving feed distributor arranged for feeding either 12 or 11 No. 7 SuperDuty Diagonal-Deck coal-washing tables, as required.

Enos Coal Mining Co., Enoco mine, Bruceville, Ind.—Installation by Heyl & Patterson, Inc., of nine 8-in-diameter cyclones, one 6-in slurry pump 3 x 15-ft Allis-Chalmers Lowhead screen and necessary equipment to handle 10M x 0 slurry, increasing plant product by 15 tph.

Dawson Daylight Coal Co., New Daylight mine, Dawson Springs, Ky.—Contract closed with Heyl & Patterson, Inc., for three 8-in-diameter cyclones, one 4-in slurry pump and 3 x 6-ft Robins Vibrex screen to handle 10M x 0 slurry, increasing product by 2 to 5 tph.

Dawson Collieries, Inc., Dawson mine, Dawson Springs, Ky.—Contract closed with Heyl & Patterson, Inc., for three 8-in-diameter cyclones, one 4-in slurry pump and 3 x 6-ft Robins Vibrex screen to handle 10M x 0 slurry, increasing product by 2 to 5 tph.

Westmoreland Coal Co., Hutchinson mine, Irwin, Pa.—Contract closed with Heyl & Patterson, Inc., for complete fine-coal plant, including eight No. 7 tables, two Reineveld centrifuges, vacuum filter and accessories, 6 x 16-ft vibrating screen and five 14-in-diameter cyclone thickeners; capacity, 100 tph raw feed, ⅜ x 0.

Crichton Coal & Coke Co., Johnstown, Pa.—Contract closed with the Daniels Co, for complete DMS dense-media coal washery to prepare 6 x ¾ or 6 x ⅜ "B" seam coal, including preparation screens, DMS medium-reclamation system, washed-coal dewatering screens, and dewatering system including cyclone thickener and Syntron dewatering screen.

Mount Hope Coal Co., Mount Hope, W. Va.—Contract closed with the Daniels Co. for complete DMS dense-media coal washery, including preparation screens, DMS medium-reclamation system and washed-coal dewatering facilities.

Marco Coal Co., Apollo, Pa.—Contract closed with the Daniels Co. for complete washer and tipple, including DMS dense-media coal washery with conveyors, feed-preparation screens, DMS medium-reclamation system, slack-handling system and dewatering facilities.

FROM THE TOP OF THE TIPPLE . . .

TO THE BOTTOM OF THE MINE

GOYNE

SOLVES YOUR PUMPING PROBLEMS

Goyne Process Pumps were designed for coal and ore preparation plants and sludge disposal service. These pumps have been working for years in many of the country's leading washers, using sand and magnetite as separating mediums. Sludge disposal installations are numerous also.

All Goyne Process Pumps feature suction pressure on the packing box. Special seals are available that admit an absolute minimum of water to the system. Seals are simple and effective and may be added to existing Goyne pump installations.

Accessibility, ease of inspection and repair, and wear adjustment, are second to none with Goyne pumps.

Mine Drainage Pumps have advanced rapidly in design. Illustrated is a 1000 hp. three stage pump installed in the same pump room with two slow speed eight stage pumps. The judicious use of modern alloys, in conjunction with modern design, has made these advancements possible.

We furnish pumps, check valves, strainers, and a complete line of automatic pump control systems, to enable today's mine manager to cut costs.

Bulletins are available upon request.

GOYNE STEAM PUMP CO.

ASHLAND • PENNA.

an ACCO product

American Cable "Green Strand" Wire Rope

What Wire Rope Do You Use on Your Carrier Scrapers?

• A complete description of a scraper cable is as long as your arm. But all you have to remember, if you are buying American Cable, is simply: TRU-LAY Streamlined Scraper Cable. And here's what you get, and why—

6 x 25 Flattened Strand—This means six strands of twenty-five wires each wound around triangularly shaped wires in the center of each strand. One flat side of the center wires of each strand faces out providing a relatively flat surface on the strand. The outsides of the six strands together make a smoother surface which gives the rope a much better bearing area against small sheaves and drums.

Independent Wire Rope Core—This adds considerably to the rope's breaking strength, and provides a solid steel core which keeps the rope from pulling down or flattening out on the small sheaves of a carrier scraper.

Lang Lay—When the wires in the strands are laid in the same cross-direction as the strands in the rope, the rope is Lang Lay. This makes the rope last longer because more of the outside wires are exposed to wear. It also makes the rope withstand more bending because of the helix of the wires. The crankiness of Lang Lay is removed by American Cable by preforming.

TRU-LAY Preformed—American Cable's Streamlined Scraper Cable is preformed to make it handle easier and last longer in bending around small sheaves. When wires do break, they stay in place instead of barbing out to slice hands and snag clothing.

Improved Plow Steel—That's what TRU-LAY Preformed is made of. The wire in this all-steel wire rope has an average tensile strength of 260,000 pounds per square inch. Look for the *green strand* which identifies this strong wire rope.

Just ask for TRU-LAY Streamlined Scraper Cable next time and every time you need rope for your carrier scrapers. You can also use it for the blade rope on your bulldozers. Your American Cable distributor stocks it and can give you quick service. Call him today or write our Wilkes-Barre, Pa., office for further information.

ACCO

American Cable Division

AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

plus ACCO Registered Wire Rope Slings

COAL MEN ON THE JOB . . .

MARY GAIL COAL CO., Wooten, Ky. —During construction at Mary Gail No. 5 mine, left photo: Steve Conder (left), chief engineer; C. H. Hodgson, district manager, Mine Safety Appliances Co.; M. H. Smith, Mary Gail general mnaager; and Eugene Simpson, general superintendent. Right photo: Rex Howard (left), general mine foreman, and Clyde Franks, superintendent, Mary Gail No. 3 mine.

BE SURE

TO SEE THESE NEW KERSEY PRODUCTS AT THE BLUEFIELD COAL SHOW

- The completely new 4-wheel drive, 4-wheel steel heavy duty tractor
- The most powerful 3-wheel tug tractor on the market.
- A new battery-powered utility truck for hauling cutting machines, conveyors pans, belting, or mounting roof drills.
- The boss's dream: Light weight battery-powered rail runabout—Up to 40 miles travel per charge.
- The revolutionary rubberail car, in three sizes.

KERSEY MFG. CO.

P. O. BOX 150, BLUEFIELD, VA.

PHONE 4228

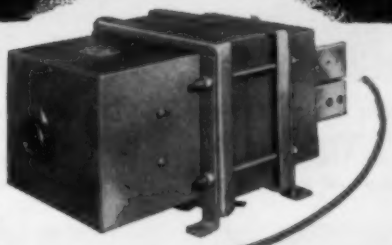
LET THE RECORDS SPEAK!

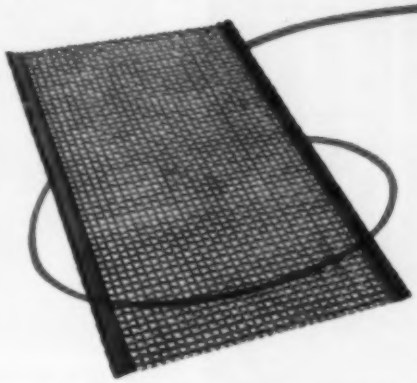
HANCO SCREEN HEATERS

ELIMINATE *Costly* SCREEN BLINDNESS

FASTER, MORE ACCURATE SIZING

HANCO electric heaters are engineered to meet top capacity requirements for heating **all** metallic screen cloth. Mechanical abuse such as "beating" or brushing can be **eliminated completely** when you install a HANCO electric heater. Treat your screens the modern way—get HANCO.





Available in five different assemblies. HANCO engineers have designed and constructed electrical screen heaters to fit YOUR make of screen. Note: Reduction in openings can be effected to meet ever changing specifications.

LOOK AT THESE FEATURES

Faster screening—faster processing means fewer "returns".

Elimination of mechanical abuse to keep screens open.

Longer screen life — no manual cleaning increases screen life up to 800%.

Fewer shut downs for replacement of worn screens.

HANCO quick change assemblies assure easy cloth changes.

Low maintenance cost. HANCO heaters are designed for heavy-duty service.

SEND FOR OUR COMPLETE BULLETIN

Hanco

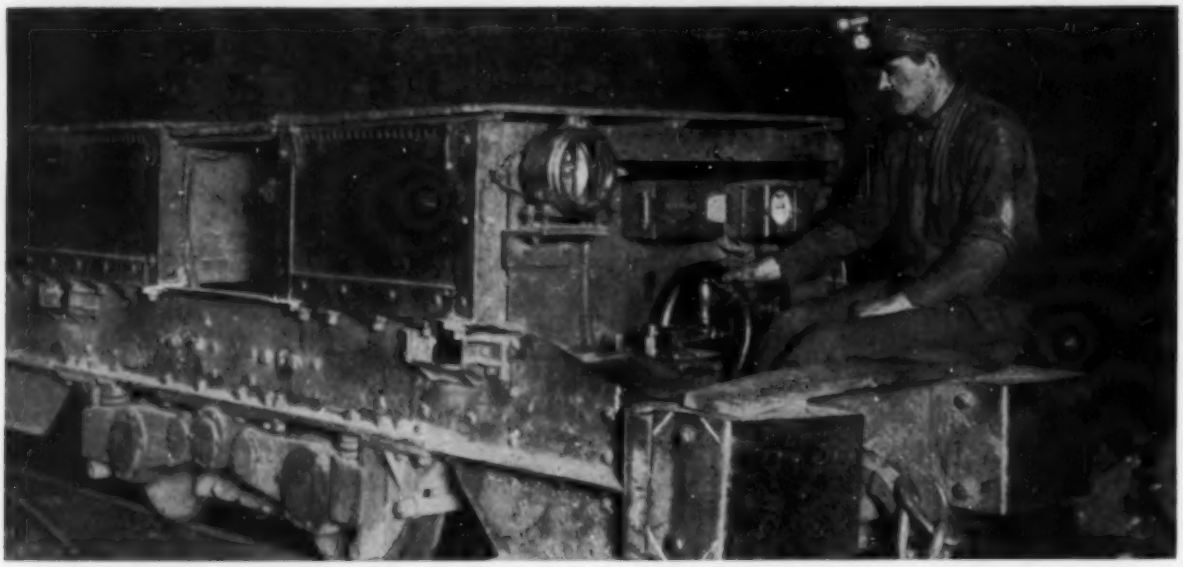
F. R. HANNON & SONS

1605 Waynesburg Rd. S.E., Canton 7, Ohio

PIONEERS IN ELECTRIC SCREEN HEATING — FIRST IN THE FIELD OF LOW VOLTAGE AND HIGH AMPERAGE SCREEN HEATING

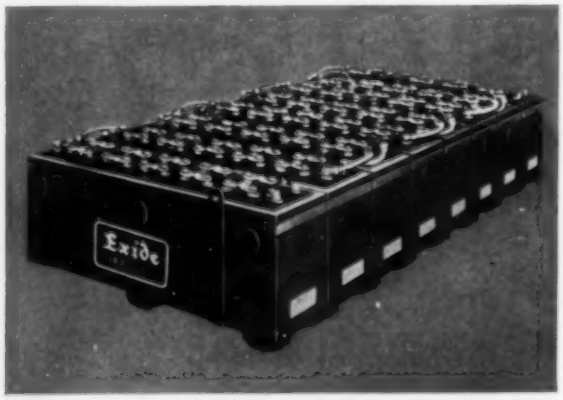
GET FAST, UNIFORM SPEEDS ALL SHIFT LONG

...with self-contained Exide-Ironclad battery power!



YOU CAN count on Exide-Ironclads to help speed up car changes, keep loaders busy and main line haulage moving fast. This means you get more trips per shift, more production per man-hour with less cost per ton handled. Exide powered equipment will handle as much tonnage during the last hour of the shift as during the first. Lower costs for operation, maintenance and depreciation make Exide-Ironclad batteries your best power buy—AT ANY PRICE!

THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power*. Also, more active material is retained, giving *longer working life*.



THE NEW THRIFTY HAULER! The improved locomotive battery using *non-oxidizing* plastic power tubes for longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

Your best power buy
...AT ANY PRICE!

Exide®
IRONCLAD® BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa. • *Exide Batteries of Canada, Limited, Toronto*

Among the Manufacturers

Caterpillar Heads Move Up

The election of Louis B. Neumiller as chairman of the board and Harmon S. Eberhard as president to succeed Mr. Neumiller was announced last month by the Caterpillar Tractor Co., Peoria, Ill. Harry H. Fair, the prime mover in Caterpillar Tractor's formation, resigned as chairman of the board but will continue as a director of the company. Mr. Neumiller joined the company as a stenographer-clerk in 1915, and 1941, at the age of 45 and after experience in many departments, was elected president. Mr. Eberhard, executive vice president since 1950, joined the firm in 1916 at the age of 16 as a draftsman. He was named chief engineer in 1933; and vice president in charge of engineering, manufacturing and research, and a director in 1942.

Barber-Greene Names Officers

Barber-Greene Co. Aurora, Ill., has announced the resignation of W. B. Greene as president, and the promotion of H. A. Barber, vice president since 1937, to that office. Mr. Greene, cofounder of the company in 1916, will continue his active participation as chairman of the board of directors. The following officers were elected: S. E. Faircloth, vice president, production coordinator; E. H. Holt, vice president, director of sales; J. D. Turner, vice president, director of publicity and promotion; H. E. Herting, vice president, comptroller; R. C. Heacock, vice president, director of manufacturing and engineering; J. M. Spence, treasurer; W. A. Greene, secretary; Urban Hipp, assistant treasurer; and F. J. Merrill, assistant secretary. Mr. Barber started with the company on a full-time basis in 1933 as a field service engineer, and later as a design development engineer and as chief engineer, until he became vice president in 1937.

Vulcan Iron Advances Chase

Vulcan Iron Works, Denver, Colo., has advanced Charles Hamilton Chase, assistant general manager for several years, to the position of general manager, succeeding R. A. Fox, who has retired but remains as a consultant to the company. Prior to joining Vulcan, Mr. Chase was associated with the American Smelting & Refining Co., Shattuck Denn Mining Corp., Consolidated Copper Mines Corp. and Shenandoah Dives Mining Co.

Fairmont Machinery Promotes

Fairmont Machinery Co., Fairmont, W. Va., has appointed Fred S. Ambrose as engineering assistant to the president, and Marcel A. Baret as chief engineer, effective April 1.

Carboloy Names Salesmen

Carboloy Dept., General Electric Co., Detroit, has named Joseph C. Betts, sales representative for Michigan and Ohio, with Detroit as his headquarters. Robert M. Pozzo has been named sales representative in the Atlantic District headquarters, Newark, N. J. Robert Drake has joined Carboloy as a field sales representative for the organization's Atlantic district, attached to the Philadelphia headquarters. Carboloy also announced that the Alden Supply Co. Inc., Philadelphia, has been named an authorized distributor carrying the department's entire line.

Syntron Irvin Agent for Daniels

The Syntron Irvin Sales Co., Indiana, Pa., has obtained the exclusive franchise to represent the H. J. Daniels Co., Inc., for sales of the Daniels Dense Media system throughout the coal areas of central Pennsylvania and portions of Maryland. D. F. Irvin heads the company.

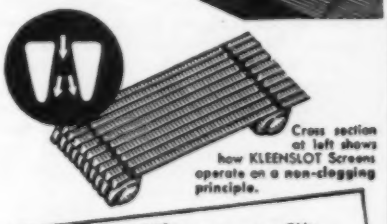
Olin Names Division Heads

Olin Industries, Inc., East Alton, Ill., has appointed H. M. Campbell general manager of the Metals Div., East Alton, and R. A. St. Clair general manager of the Electrical Div., New Haven, Conn. Mr. Campbell succeeds M. F. Meissner who has been acting manager since Mr. Meissner's appointment as Olin vice president for operations in December. Mr. St. Clair succeeds R. A. Ostberg, vice president for production, who has been acting manager of the Electrical Div. The appointment of Charles H. Schminke as field sales manager of its

Kleenslot
THE IDEAL SCREEN FOR DEWATERING AND SIZING

THEY CAN BE DESIGNED AND ADAPTED TO FIT ANY MAKE OF VIBRATOR

Perfect separation on wet or dry screening. Rigid construction and method of installation prevents "whipping".

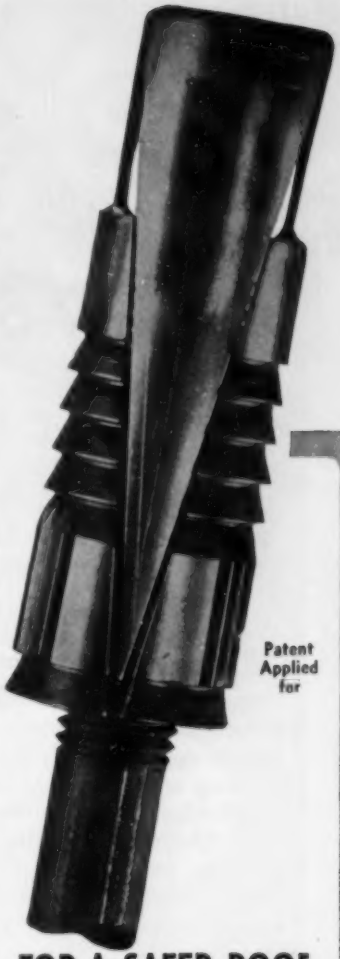


Cross section at left shows how KLEENSLOT Screens operate on a non-clogging principle.

WEDGE WIRE CORP.
Gas St. at Nickel Plate R.R., Wellington, Ohio
Gentlemen:
Please send us literature outlining the superiority of Wedge Wire construction.
COMPANY _____
NAME _____
ADDRESS _____

SEND FOR OUR ILLUSTRATED LITERATURE

Wedge-Wire CORPORATION
GAS ST.
AT NICKEL PLATE R.R.
WELLINGTON, OHIO



Patent Applied for

FOR A SAFER ROOF
Hard or Soft

The PATTIN expansion shell anchors equally well in a hard or soft roof as it has double the usual shell expansion plus a 3-inch parallel contact with the hole wall which provides the strongest known anchorage for roof bolts.

They are easy to install as no definite drilling depth is required and the shell can be anchored any place in the hole without turning while being tightened. There's no loss of parts in handling as the shell and wedge are locked together and no special nuts or ears are needed for the bolts.

Our engineers are available for consultation and demonstrations. Write or phone us—we'll gladly work with you on any present or future bolting program.

PATTIN
MFG. COMPANY
Marietta, Ohio
Est. 1888

This is the pump with the deep stuffing box under suction pressure only. Entrance of grit into stuffing box is minimized—slurry dilution from stuffing box leakage negligible. The pump requires only nominal sealing water pressure, yet can operate under high vacuum as well as high suction heads. Because of this design, stuffing box troubles are practically eliminated.

The Morris Type R is built for handling refuse, sludge, chemicals in suspension, tailings, concentrates, coal, any liquid containing abrasive solids. For long term efficiency and economy, for a minimum of maintenance and shutdowns—specify Morris Type R Slurry Pump.

MORRIS
MACHINE WORKS
Baldwinsville, N.Y.
Offices in Principal Cities

FREE TECHNICAL SERVICE
Free technical consultation with Morris engineers at your request. For further information write today for Bulletin #181.

MORRIS *Centrifugal Pumps*

Ramset Fasteners, Inc., Div., Cleveland, also has been announced by Olin Industries.

Dorr Co. Sets Up Fellowships

A fellowship for graduate study in the fields of metallurgical, chemical, and sanitary engineering has been established by The Dorr Co., Stamford, Conn., to commemorate the golden jubilee of the invention of the Dorr classifier by Dr. John Van Nostrand Dorr. The fellowships will be administered by an endowed trust known as the Dorrco Educational Trust, and the initial fellowship has been offered to Rutgers University, of which Dr. Dorr is both a graduate and trustee, and will be for graduate studies to be carried out in its Department of Sanitation. The 1-yr appointment will carry with it a stipend of $1,800 per year plus tuition and 1 mo vacation.

Marion Names Sales Engineer

Marion Power Shovel Co., Marion, Ohio, has named Clarence S. Jarvis to its Birmingham, Ala., district office as sales engineer. Mr. Jarvis, a Marion service and erection engineer for 8 yr, will work in a territory covering Louisiana, Florida, Alabama, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, and part of Arkansas.

Bend Retires from ESB

The Electric Storage Battery Co., Philadelphia, has announced the retirement of Charles L. Bend, Denver sales engineer, after more than 32 yr of service. Associated with Exide since 1922, he was transferred to the Denver branch in 1928 as a sales engineer.

Glen Heads Johnston Pump

Johnston Pump Co., Pasadena, Calif., has elected Hugh Glen president of the company, succeeding Mrs. Thomas W. Simmons, who has resigned as president but is still sole owner of the firm. Mr. Glen was formerly president of Emsco Derrick & Equipment Co.

And For Your Information . . .

International Harvester Co., Chicago, has appointed Russel C. Burns supervisor of the company's motor truck fleet sales. Mr. Burns, a 20-yr Harvester sales veteran, has served as general supervisor, used truck merchandising, since May, 1952. R. H. White has been named manager of the company's new Lubbock, Tex., motor truck district. Mr. White formerly served as manager of the Tulsa district.

Firth Sterling, Inc., Pittsburgh, has assigned William K. Neff to the company's Mideastern Dist., following completion of a recent sales-training program. Mr. Neff, for the past 4 yr, represented both Firth Sterling and Austin Powder Co. in mining sales and formerly was a field engineer with the Joy Mfg. Co.

Athey Products Corp., Chicago, has appointed H. S. Jones, district representative, with headquarters in Cleveland. Mr. Jones will work with Athey distributors in Ohio, Indiana, Pennsyl-

HUMBOLDT
Since 1856
Mines Equipment, Mineral Dressing Plants, Crushing and Grinding Machinery, Cement Mill Outfit, Metallurgical Works, Coal Preparation Plants, Steel Constructions for Buildings and Bridges
DEUTZ
Since 1864
Otto-, Gas, Diesel-Engines for Every Purpose of Two- and Four-Stroke design, Output range 3 - 1500 H.P. Cooled by water or air, Diesel-powered tractors, Diesel locomotives, Gas producer plants.
MAGIRUS
Since 1864
Trucks and busses driven by air-cooled DEUTZ Diesel engines, Vehicles for municipal services, Fire ladders, fire engines, Fire fighting water trucks, Two-wheeled ladders, Fire fighting equipment.
KLÖCKNER-HUMBOLDT-DEUTZ AG · KÖLN U. ULM

Send inquiries to either Köln, Germany or Ulm, Germany

4 STAR TIMER

★ Low in Cost
★ No false contacts
★ No chatter
★ Quiet in operation

HYDROGEN SEALED

Durakool
STEEL MERCURY TIMERS

The steel-clad factory set Durakool timer-relay operates in "sealed in" hydrogen under pressure, with mercury to mercury contacts. Timing is tamperproof. Non-breakable and built for millions of contacts. Fixed time delays available from 1/6 to 20 seconds, either normally open or normally closed action.

See Telephone Directory for Local Distributor or write
Durakool, Inc. Elkhart, Indiana
50 St. Clair Ave., W. Toronto
Send for Bulletin 800

CUSTOM DESIGNED
.... FOR PERFORMANCE

FLOOD CITY
GENERAL PURPOSE
CENTRIFUGAL PUMPS

"FLOOD CITY" designs each and every pump for the individual job on which it is to be used. This small, sturdy pump is extremely simple to operate and maintain. Its open type, non-clogging impeller is ideal for many purposes. Made of anti-corrosive material of your choice it is still extremely economical both in first cost and in operation.

We have built acid resisting pumps from 1¼" to 6" capacity for many years and would welcome the opportunity to advise you on your pump problems.

FLOOD CITY
BRASS & ELECTRIC CO.
JOHNSTOWN, PA.

Sales Agent
Kanawha Rail & Machinery Co.
Charleston, W. Va.

vania, Michigan and parts of Kentucky, West Virginia and Canada.

Reliance Electric & Engineering Co., Cleveland, Ohio, has added the following three application engineers, as a part of the continuing growth of its nationwide field sales organization. Arthur J. Stockslager, Atlanta, Ga., district sales office; R. C. Marchant, Toledo, Ohio, branch sales office; and Don S. Follett, Rockford, Ill., branch sales office.

Dravo Corp., Pittsburgh, has selected The College of Engineering at Cornell University as a participant in its annual $12,000 scholarship program, in which four schools now are sharing. The program, which provides for two $1,000 scholarships in each university each year, and two additional grants of $500 to the university itself, has been instituted at Carnegie Institute of Technology, Lehigh University and the University of Pittsburgh, also. Awards will be made primarily on the basis of scholastic ability and personal characteristics which indicate potential capacity to succeed in either engineering or business administration.

The Parker Appliance Co., Cleveland, Ohio, has appointed the Ritter Engineering Co., 1515 W. Liberty Ave., Pittsburgh 26, as a new distributor for Parker Hoze-lok fittings, serving the coal mining industry of western Pennsylvania and much of West Virginia. This latest distributor appointment is part of Parker's accelerated program to meet the increasing demands for fluid and hydraulic components in industrial centers across the country, it reports.

Wedge Wire Corp. has moved to its new plant located on Gas St. at Nickel Plate R.R., Wellington, Ohio. The move, according to W. E. Bixby, president, will enable the company to render more efficient customer service.

Mine Safety Appliances Co., Pittsburgh, has named Arch S. Abbey manager of the Latin-American section, International Div. Mr. Abbey, well-known in mining and industrial activities throughout Central and South America, has been associated with the company since 1935. In his new post, Mr. Abbey will supervise MSA's sales of mining and industrial safety equipment throughout Latin America.

Combustion Engineering, Inc., has named R. C. Ulmer head of the research department, succeeding B. J. Cross, who has been appointed research consultant. Prior to joining Combustion Engineering in 1953, Dr. Ulmer was employed by the Columbus & Southern Electric Co. in 1930 and subsequently by The Detroit Edison Co. Mr. Cross, who succeeded the late Dr. Henry Kreisinger as head of the research department in 1946, joined the company in 1920.

Fairbanks, Morse & Co., Chicago, has announced the organization of a new Electronics Div. for the research, development, application engineering, and manufacture of electronic devices and apparatus used in conjunction with vari-

M-R-C's contribution to the
coal mining industry — SYNTHE-SEAL ball bearing

the **M-R-C** "Synthe-Seal" bearing
Pat. No. 2,467,049

A standard-dimension ball bearing with a removable synthetic rubber seal for keeping out dirt, grit and moisture and for keeping in lubricant.

MARLIN-ROCKWELL CORPORATION, Jamestown, New York

MORE BARNEY CAR-SPOTTERS

will be sold this year

than in the last ten years!

INVESTIGATE THE COST REDUCING ABILITY OF THE

STAMLER HYDRAULIC

PIONEER & ACKNOWLEDGED BEST BECAUSE OF ITS

- PROVEN RELIABILITY
- PROVEN LOWEST MAINTENANCE
- PROVEN RESULTS OF INCREASING TONNAGE AND REDUCING COSTS.

LET US PROVE THIS TO YOU!

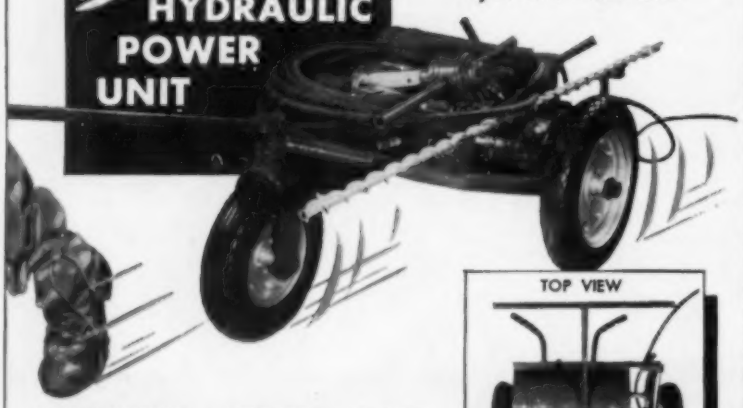
The W. R. STAMLER CO.

PARIS, KENTUCKY

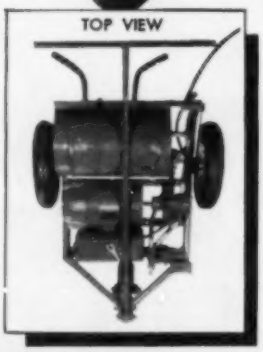
Schroeder Bros., Exclusive Sales Agent, Pittsburgh, Pa.

New TRICYCLE HYDRAULIC POWER UNIT

for use with the Schroeder Hydraulic Coal Drill



TOP VIEW



LIGHT WEIGHT - RUGGED - MOBILE

From the first, the Schroeder Hydraulic Coal Drill has chalked up the highest standards of performance and service. Now comes this Tricycle Hydraulic Power Unit to further increase the value and efficiency of the drill.

Featuring simple hydraulic system and standard electrical equipment, the unit is light, sturdy and highly maneuverable. Complete weight with oil, drill, chuck and hoses is only 615 pounds. Can be propelled by hand in all but the worst bottoms. Less than 22" high and approximately 60" long—it has a bottom clearance of 6½" and a tread width of 36". The new Schroeder Tricycle Power Unit, plus the Schroeder Hydraulic Coal Drill, provide you the best complete drilling unit for face operation. Write today.

3116 Penn Ave. Pittsburgh 1, Pa.

SCHROEDER BROTHERS

HYDRAULIC, ELECTRIC & PNEUMATIC MINING EQUIPMENT

EXpress 1-1571

ous Fairbanks-Morse products. L. J. Maguire, formerly general manager, St. Johnsbury, Vt., works of the corporation, has been appointed manager of the division, with offices in Davenport, Iowa, where the company already has a scale research group in operation.

Galion Allsteel Body Co., Galion, Ohio, has named Edward R. Curry southwestern regional sales manager at Tulsa, Okla. Mr. Curry was formerly district sales manager for the St. Paul Hydraulic Hoist Div., Gar Wood Industries, Inc.

Caterpillar Tractor Co., Peoria, has begun site preparation work for its new plant at Decatur, Ill. The site preparation is scheduled to be completed in early September and plans call for all steel to be erected by the end of November. The manufacturing building is to cover an area 880 x 830 ft, with approximately 730,000 sq ft of floor area, and will be similar in design and appearance to the building now in use at Joliet, Ill.

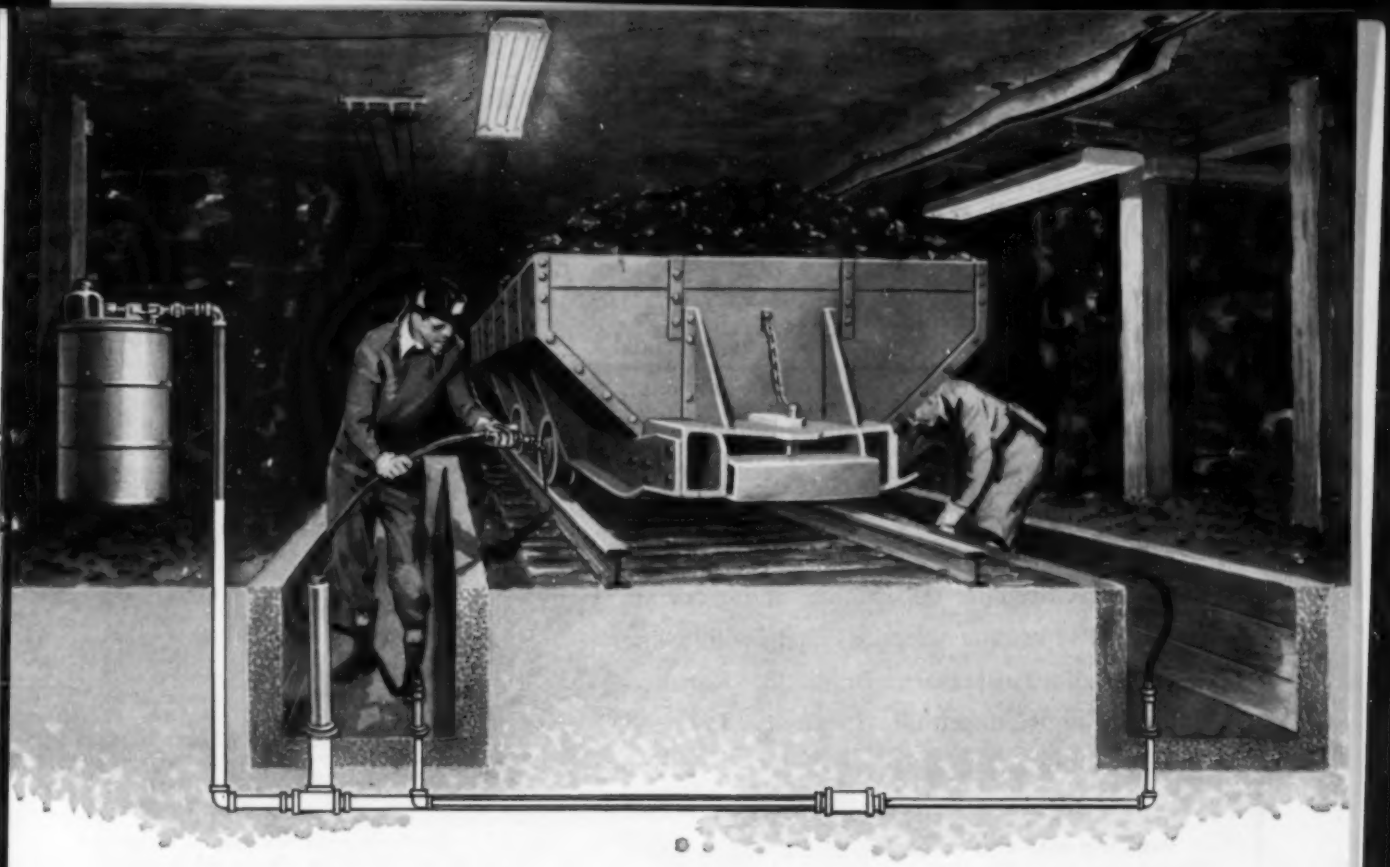
Pennsylvania Salt Mfg. Co., Philadelphia, has established two new operating divisions to provide more logical product grouping and better customer service for expected future growth. The Industrial Chemicals and Chemical Specialties Divs. will function as complete operating units responsible for both the manufacture and sale of their respective products. William P. Drake, vice president in charge of sales, has been named president of the Industrial Chemicals Div.; Albert H. Clem, general sales manager, has been named president of the Chemical Specialties Div.; William F. Mitchell, formerly head of Pennsalt's manufacturing activities, has become vice president in charge of engineering, purchasing and traffic for the consolidated company.

Allis-Chalmers Mfg. Co., Milwaukee, has announced the formation of Allis-Chalmers, Great Britain, Ltd., a wholly-owned subsidiary, organized to handle all Allis-Chalmers operations in the British Isles and in export markets served from the United Kingdom. The firm's British manufacturing operations are concentrated at Essendine, England, and managing director of the new company is E. J. Mercer, general manager of the tractor division's English branch at Totton, Southampton, since 1951.

Link-Belt Co., Chicago, has appointed Donald E. Thal central general manager of its Pacific Div., with headquarters in San Francisco, where he had been sales manager. Mr. Thal joined Link-Belt in 1936 and has since served in the engineering departments of Link-Belt plants in Chicago, Seattle and San Francisco.

Newark Wire Cloth Co., Newark, N. J., has appointed Lewis K. Stamp, Alliance, Ohio, representative for the state of Ohio and Erie County, Pa.

Aero-Coupling Corp., Burbank, Calif., a subsidiary of Aeroquip Corp., Jackson, Mich., has increased plant capacity by a new addition designed to better serve West Coast customers with faster delivery on short-run items and sample parts.



Here's a way to help a coal mine show a profit!

Alemite Barrel Pumps cut mine car lubrication time in half —extend bearing life—slash maintenance—boost tonnage!

These two pits, above ground or below, allow mine cars and locomotives to be lubricated almost "on-the-go." Important time savings are the immediate result, but even more important are increased bearing life—the savings in downtime and maintenance! And tonnage goes up because the car stays on the job, where it belongs!

Simplified system pays for itself—FAST! Installation is easy, and savings quickly pay the modest cost. From the Alemite Barrel Pump, lubricant is piped to the two outlets equipped with Alemite Control Valves. Operators have finger-tip control of lubricant where they need it—right at wheel level. Lubricant stays "refinery clean"—free of dust and grit!

The powerful "Heart of the System" is the Alemite Barrel Pump. It has the power to completely flush out old grease and grit. To supply the bearing with fresh, effective lubricant—in seconds! Alemite Barrel Pumps can handle one or many outlets, are available in a wide range of types and sizes to *exactly* fit your needs.

A trained Alemite engineer will be happy to explain this and other ways modern lubrication methods can save you money—help MAKE you money! And this service is absolutely FREE to you! Simply write Alemite, Dept. E-54, 1850 Diversey Parkway, Chicago 14, Illinois, for FREE information!

A PRODUCT OF SW STEWART WARNER

ALEMITE

REG. U. S. PAT. OFF.

Lubrication Methods that Cut Maintenance Costs

THE HEART
of your preparation plant

Successful coal cleaning oftentimes depends upon the proper type of crushing of raw coal, middlings, and refuse. Your crushing equipment is not an auxiliary but is the heart of your preparation plant.

Pennsylvania has specialized in this field and has developed a dependable and accurate method of crusher selection, along with a line of Bradford Breakers, Bradmills, Hammermills, Ring Hammermills, Impactors, Jaws and Single Rolls.

Our engineers welcome the opportunity of working with you on any coal cleaning or sizing problems you have.

Ask us to send you our new catalog of crushers for the coal mining industry, Bulletin No. 4010. Pennsylvania Crusher Company (division of Bath Iron Works, Inc.)
Room 1711, West Chester, Pa.

PENNSYLVANIA CRUSHERS

Bradford Breakers
Bradford Hammermills
Bradmills
Reversible Hammermills
Non Reversible Hammermills
Ring Hammermills
Dixie Hammermills
Dixie Non Clog Hammermills
Single Rolls
Reversible Impactors
Kue-Ken Jaws
Kue-Ken Gyracones

Thor Power Tool Co., Aurora, Ill., in expanding its power tool manufacturing operations into the low-price electric tool market, has purchased the Speedway Mfg. Co., Chicago. The newly acquired company will continue with the same personnel at the Chicago plant, and under the same executive management of William B. Scace, Speedway president, and Jack R. DeBacher, vice president, and will operate as the Speedway Mfg. Div. of Thor Power Tool Co.

Railroads Urged to Cut Coal Freight Rates

Ford K. Edwards, director of the Department of Coal Economics, National Coal Association, April 13 called on the railroads to cut freight rates for coal to help the industry fight competition of foreign residual oil and natural gas. Addressing the annual dinner of the Indiana Chapter of the American Society of Traffic and Transportation, Mr. Edwards pointed out that "coal is selling today at the mine for less than it did in 1948, despite a rise of some 30% in wages and supplies and large increases in welfare and other benefits to its labor force," and that in this period "rail rates have steadily risen, with carriers receiving almost the same percentage increases on coal as on the highest grade articles in commerce."

Emphasizing that the railroads are taking 40c in freight charges out of every dollar of the delivered price of industrial coal, "it is high time," Mr. Edwards said, "that the railroads dropped their role as a disinterested spectator and stood shoulder to shoulder with the coal producers in a united effort to hold the line. . . ."

Mr. Edwards gave credit to several railroads which have "broken the ice" in recent months and put into effect rate reductions of 35 to 50c a ton or more to hold particular markets that were slipping away to natural gas, or in some cases, to water carriage.

Association Activities

Davis Retires From NCA

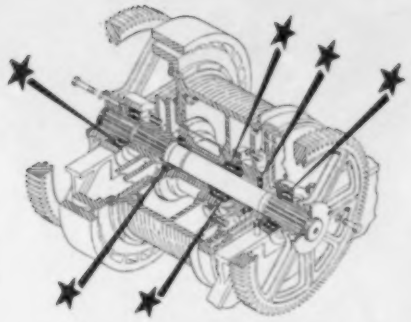
At a board meeting of the National Coal Association held last month, the resignation of Edwin H. Davis, New York Coal Co., as an NCA director was accepted with regret and tribute was paid to his service to the association, which began in 1939. Mr. Davis, who is retiring from the coal industry, also served as NCA treasurer from 1949 to 1952. Whitney Warner Jr., president, Warner Collieries Corp., Cleveland, was named a director to succeed Mr. Davis.

Indiana Group Pick Officers

The Northern Indiana Coal Traffic Association, at its annual meeting held in Terre Haute, Ind., April 2, re-elected the following officers: W. S. Webster, Walter Bledsoe & Co., president; Hugh B. Lee, Maumee Collieries Co., vice president; and C. R. Templeton, Templeton Coal Co., secretary-treasurer. Directors elected were: Gregory S. DeVine, Shasta Coal Corp.; Reed Moyer, Sherwood-Templeton

LIMA'S

shafts and drums roll on anti-friction bearings



STARS INDICATE LOCATION OF ANTI-FRICTION BEARINGS IN DRUMS AND PILLOW BLOCKS

As a result of twenty-five years' experience with anti-friction bearings, Lima design engineers know exactly where to put them to give you maximum benefits. This cut away view shows how Lima utilizes anti-friction bearings in the drums. X-ray vision would show you how Lima uses them throughout the main machinery on all shafts and other important parts.

This modern means of eliminating destructive friction benefits LIMA owners through faster operating speeds and lower upkeep. Anti-friction bearings also maintain perfect shaft alignment and insures smoother, easier clutch action.

LIMA Type 2400, equipped with 120' boom, 6 cu. yd. bucket.

COMPARE! No other machine gives you as much as LIMA!

1. Bronze bushings in tread, idler and drive rollers are protected by piston-type dirt seal rings and retainers.
2. All gears, smaller parts and shafts which are subject to extra wear are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation to eliminate excess counterweight.
4. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
5. Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
6. Full air controls on travel, hoist, swing and boom hoist, result in smoother, more precise operation, minimum maintenance and less operator fatigue.
7. Torque converter (optional) automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster.
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (¾ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA

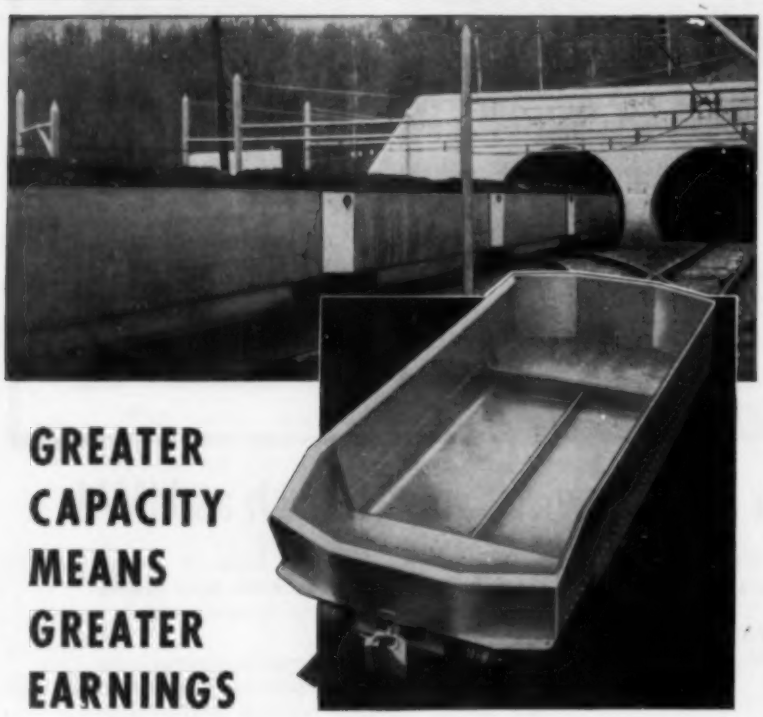
SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

COAL MEN ON THE JOB . . .

REPUBLIC STEEL CORP., Republic mine, Pikeville, Ky.—Left photo, second-shift assistant foremen, except as noted—Raymond Ratliff (kneeling, left); Low Hogsten, electrician foreman; Clyde O'Brian; E. Rowe; Ted Simpkins (standing, left), general night foreman; J. E. Collins, general mine foreman; A. O. Coleman, rock foreman; and Thos. E. Childers. Right photo: Eddie Rowe (left), Ersel Ratliff, E. E. Collins and E. C. Compton, section foremen, first shift.



GREATER CAPACITY MEANS GREATER EARNINGS

When we say "greater capacity" we mean just that. Within given length, width and height, you'll realize greater cubic footage in Differential Mine cars than in any other make. Differential's special, patented, AXLESS truck design is largely responsible. There are other important benefits, also, in this Differential feature — increased safety, less spillage, easier riding, etc.

When we say "greater earnings" we mean that, too!

Whether you think in terms of:

- **FEWER CARS REQUIRED** (therefore lower investment in equipment)
- **LESS MAINTENANCE** as a result of fewer cars needed and less spillage.
- **LOWER OPERATING COSTS** (greater ratio of payload to gross weight, higher speeds, etc.)

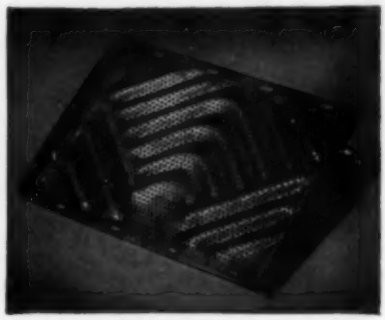
or any of several other factors affecting your operations, you'll enjoy greater earnings with these cars. Send now for Mine Car Folder, D-53.

Differential Products Include: Locomotives, mine cars, mine supply cars, rock larries, mantrip cars, air dump cars, dumping devices and complete haulage systems.

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO

SINCE 1915 — PIONEERS IN HAULAGE EQUIPMENT



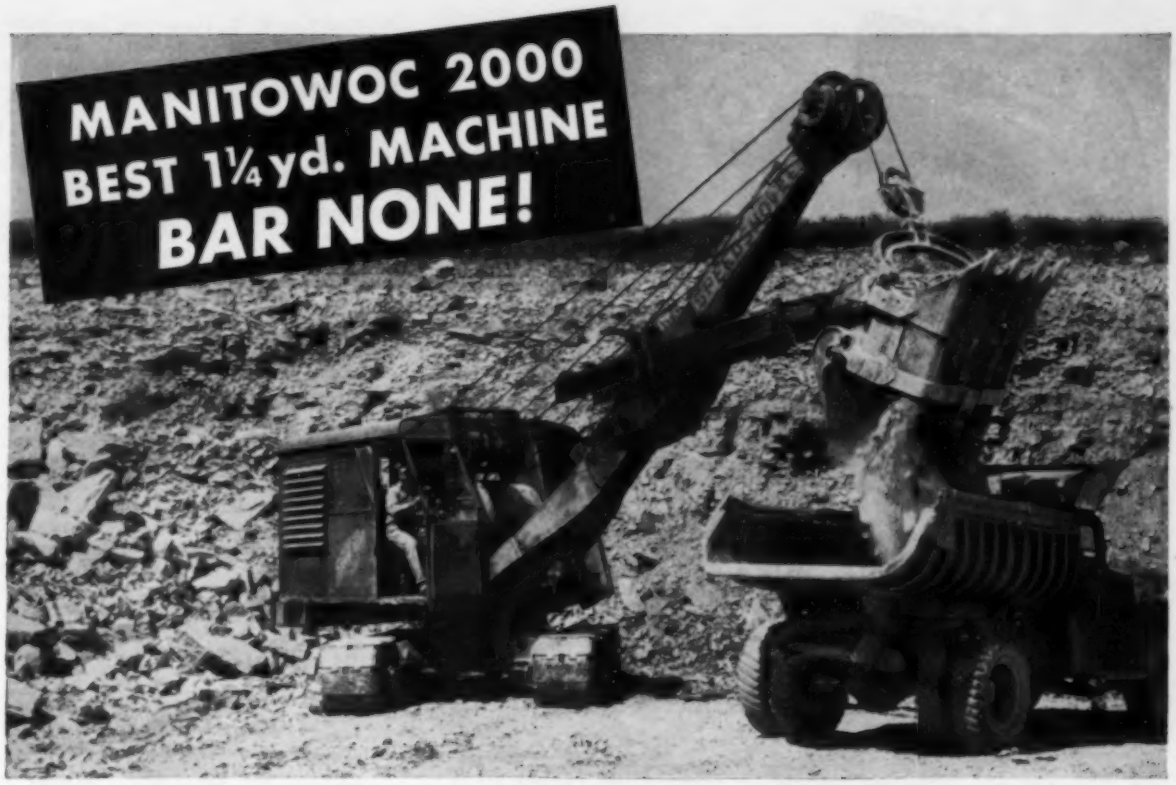
"W" DENTED SHAKER SCREENS

A "must" when it comes to obtaining an efficient job! *Good* because the spreading and collecting riffles give uniform spread of material over the entire screen surface . . turns the top and middle flow of material down in direct contact with the screen . . . gives an increased screening efficiency up to 33% on fine sizes over an undented flat screen.

Comes in Carbon and Stainless Steels and Manganese Bronze. No sag.

Write us today. We shall reply promptly.

REMALY MANUFACTURING CO., INC.
TAMAQUA, PA.



Thousands of Manitowoc 2000 owners have proved to themselves that it's the fastest, most powerful, most productive 1¼ yd. machine in its class — in fact, it will match many machines in the 1½ yd. class.

It has BIG capacity — 25 tons lift at a 12′ radius. It has tremendous power at the dipper, because of simplified design — only 13 gears throughout, and each one saved adds power at the dipper. It has faster working speeds — TORQUE CONVERTER drive, if desired — rugged construction throughout, and long, wide crawlers for maximum stability.

It's big in performance, yet fast from job to job. Can be "trailered" or shipped on a flat car, without any dismantling, except if long crane boom is attached. Offers you the most versatile choice of optional equipment and attachments.

Before you buy any excavator, get complete details on this versatile Model 2000. Manitowoc Engineering Corp., Manitowoc, Wis.

FASTER CYCLES

Fast, safe operating speeds mean higher output. Compare hoist speeds as high as 216′ per minute, swing 4.15 R.P.M. and travel 1.05 M.P.H. Simplified design — simplified operation, mean more yardage on any job.

Master of Many Jobs

- **LIFT CRANE, with hook block and single ship line.**

- **CLAMSHELL, with torsion spring tagline and automatic holding line take-up.**

- **DRAGLINE, with swivel type fairlead, 1¼ yd. general purpose.**

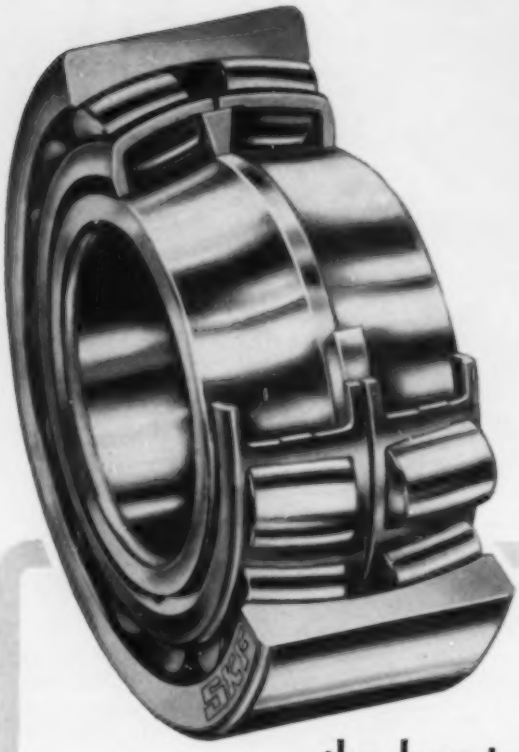
- **1¼ yd. STANDARD SHOVEL with 22½′ boom, 16′ sticks.**

- **HIGH LIFT 1¼ yd. SHOVEL with 26′ boom, 18′ sticks.**

- **TRENCH HOE with 22′ boom, 12′ stick, and 1¼ yd. capacity.**

MANITOWOC

SHOVELS 1-5 YD. — Speedcrane — CRANES 18-100 TON



the bearing that

LIVES LONGER

comes from **SKF**

For your next replacement job, why not buy the spherical roller bearing that will *last* up to 3½ times longer than any other available design?

That's right—SKF's *improved* (Type "C") Spherical Roller Bearing *will* provide, size for size, 2 to 3½ times more life, and up to 50% increased capacity . . . *at no increase in cost.*

Your nearby SKF Distributor can show you how the original SKF Spherical design has been improved to reach this higher performance level, and, in the most popular series, can supply your requirements promptly from his stock. Remember—your SKF Distributor is a trained specialist in helping industry *put the right bearing in the right place.* **SKF INDUSTRIES, INC.,** PHILADELPHIA 32, PA.— *manufacturers of* **SKF** *and* HESS-BRIGHT® *bearings.*

7532

SKF®

BALL AND ROLLER BEARINGS

Coal Co.; P. H. Templeton, Linton-Summit Coal Co.; and Messrs. Lee and Webster. Harold V. Scott was re-elected executive vice president and traffic manager.

Pocahontas Operators Elect

At the annual meeting of the Pocahontas Operators' Association, Mar. 26, held at the New Yorker Hotel, New York City, Henry F. Warden, president, American Coal Co., McComas, W. Va., was elected president, succeeding William Beury, president, Algoma Coal & Coke Co., Algoma, W. Va., who had served the organization as president for the past 4 yr. Roland C. Luther, executive vice president, Peerless Coal & Coke Co., Bluefield, W. Va., was elected treasurer of the association, succeeding Mr. Warden. Other officers re-elected included H. R. Hawthorn, vice president, and B. B. Housman, secretary. The executive committee, composed of Mr. Warden, chairman, Mr. Hawthorne, Mr. Beury, Mr. Luther, A. R. Mathews, J. J. Foster, W. W. Walker and Samuel A. Crozer, was re-elected, and there were no changes made in the representatives on the boards of affiliated groups or on the committees within the Association.

New Books for Coal Men

Controlling Acid Mine Water

Drainage From Bituminous Coal Mines, by K. L. Temple and W. A. Koehler. This is a report on research conducted at West Virginia University under the sponsorship of Bituminous Coal Research, Inc. Though no practicable solution for the problem of acid mine water is yet known, this study attributes acid formation to the presence of iron disulphide in the coal and associated strata, exposure of these materials to water and air by mining, chemical oxidation of finely divided iron disulphides and the action of bacteria in aiding oxidation. *Engineering Experiment Station, Research Bulletin No. 25. 35 pp. 8½x11-in; paper. No price quoted. West Virginia Bulletin, Morgantown, W. Va.*

New Helps for Foremen

Two pocket-size booklets aimed at foremen may be helpful in (1) bringing supervisors to re-evaluate their personal attitudes and habits and (2) smoothing the way for new Negro employees. Both are published by *Bureau of Business Practice, National Foremen's Institute, Inc., New London, Conn. They are:*

1. **Who . . . You?,** by James F. Bender. *15 pp. 1 to 50 copies, 20c each; 51 to 250, less 10%; 251 to 500, less 15%; 501 to 1,000, less 20%.*

2. **Why?** *15 pp. 1 to 50 copies, 25c each; discounts for additional copies, as above.*

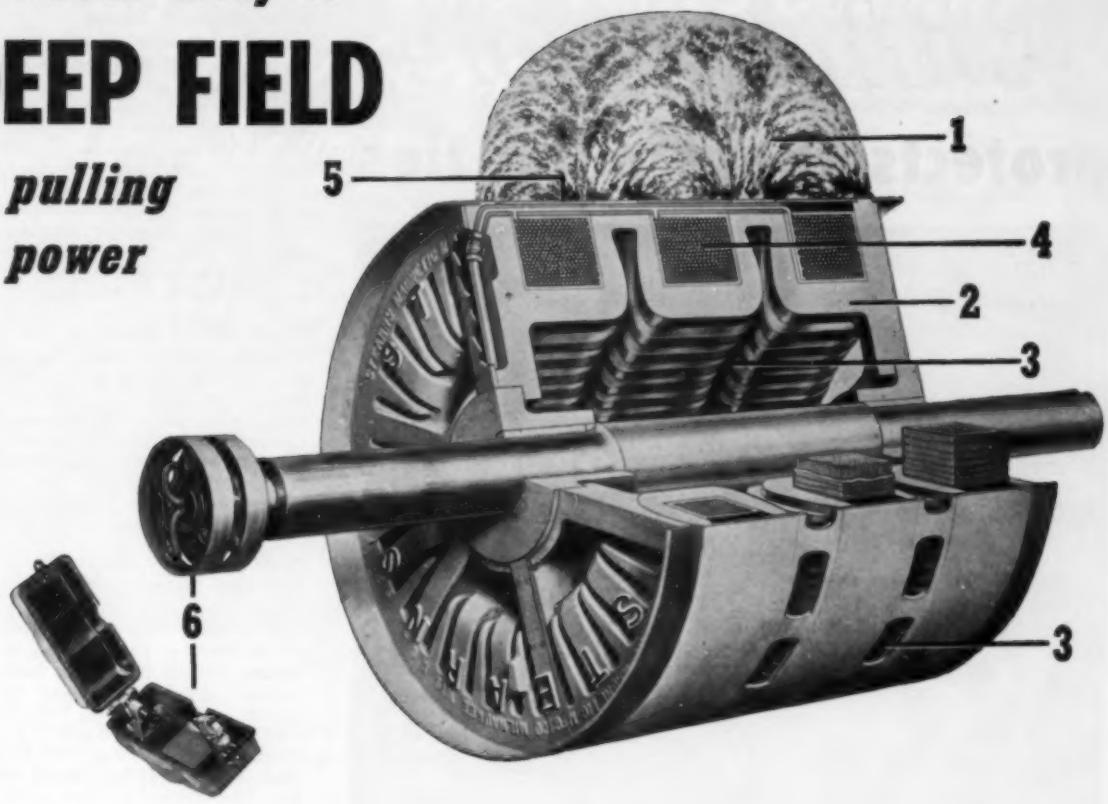
Burning Coal Better

Productivity Report—Fuel Conservation. This volume reports what a visiting British productivity team found about fuel use and conservation in the United States. The team visited 45 plants in the

Inside story of

DEEP FIELD

pulling power



STEARNS ELECTRO-MAGNETIC PULLEY

Here you can see at a glance why powerful Stearns electro-magnetic pulleys effectively remove tramp metal from conveyor lines even though material flow is fast and belts are heavily loaded.

Check these six big features:

1. **Magnetic Field.** Deep, strong, magnetic field provides maximum pull when tramp metal is trapped between large pieces of bulk material.
2. **Magnet Body.** Solid, one-piece dynamo steel casting. No tie rods to loosen and cause trouble.
3. **Air Cooling.** Constant stream of cool air to pulley interior dissipates heat fast, keeps magnetic strength high.
4. **Coil Windings.** High dielectric insulating varnish is baked on, covered with spun glass fiber insulation, then sealed with bakelite varnish. Welded, not soldered coil joints.
5. **Coil Covers.** Steel covers eliminate dead spots — distribute magnetic force lines uniformly over pulley face.
6. **Collector Rings, Brush Holders and Housing.** Bronze collector rings are bakelite-insulated, machine-fitted to shaft and enclosed in shock-resistant cast-iron housing which contains heavy bronze brush holders.

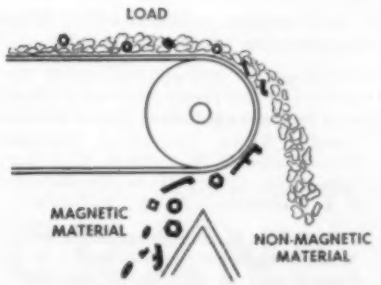


Diagram showing how Stearns magnetic pulley removes tramp iron.

1065

Magnetic Pulleys of the permanent magnet type also available where indicated or desired. Write for descriptive catalog 303B.

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

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STEARNS MAGNETIC, INC. 661 S. 28th St., Milwaukee 46, Wisconsin

Pressure-Treatment -with creosote protects these mine ties

Koppers Pressure-Creosoted Mine Ties and Cribbing in service at Winifrede Collieries, Winifrede, West Virginia.

• Mr. H. C. Morton, pictured here, is Superintendent of Winifrede Collieries – a West Virginia mine that dates back to Civil War days. Like so many mine operators, Mr. Morton believes in using wood that has been pressure-treated with creosote. In his mine, Koppers Pressure-Creosoted Wood is used extensively for mine ties, cribbing, trolley poles and railroad ties.

Pressure-treatment with creosote offers a permanence not available in other preservative treatments. In this process, wood is *not* merely dipped, soaked or brushed. Instead, creosote is forced—*under pressure*—deep into the wood, thoroughly protecting it against decay and termite attack.

Creosote comes from the coal you mine; it is widely accepted as the most effective wood preservative in use today. It protects millions of ties for railroads and millions of poles for utility companies. Play safe by using Koppers *Pressure-Creosoted* Wood. The combination of pressure-treatment—plus creosote—is unbeatable. To find out what this combination can do for you, send for our free booklet – "10 Proven Ways to Cut Mining Costs."

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WOOD PRESERVING DIVISION
PITTSBURGH 19, PENNSYLVANIA

United States, including power and light, gas and boiler plants, hospitals, laundries,, etc. *PB 106480. 120 pp. $1.25, Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C.*

New Heating Guide

Heating, Ventilating and Air Conditioning Guide (1954 edition). This standby annual this year includes a new chapter on residential summer air conditioning, plus revised and updated chapters on heating load, fuels and combustion, chimneys and draft calculations, panel heating, district heating and automatic controls. *Technical data section, 1,128 pp; manufacturers' catalog section, 496 pp. 6x9-in; cloth. $10, American Society of Heating & Ventilating Engineers, 62 Worth St., New York 13, N. Y.*

More Safety Helps

National Safety Council has published two new data sheets dealing with coal-mining operations. Both are available from the council, 425 N. Michigan Ave., Chicago 11, Ill. Data sheets are:

Safety Specifications for Locomotives in Coal Mines (D-262).

Grounding Electric Shovels, Cranes and Other Mobile Equipment (D-257).

New Research Journal

Mineral Industries Journal, Vol. 1, No. 1. This is a new periodical publication reporting research and development by the School of Engineering and Architecture, Virginia Polytechnic Institute, in geology, geophysics, mineral dressing, mining engineering and related fields. First issue of 8 pp contains an article titled "Some Aspects of Roof Control in Coal Mines," by Prof. C. T. Holland. *Free upon request to Dean of Engineering and Architecture, V. P. I., Blacksburg, Va.*

Other Books and Booklets

The following publications by the U. S. Bureau of Mines are available free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10½-in; paper; mimeo.

Recommendations on the Prevention and Suppression of Dust in Mining, Tunneling and Quarrying, Adopted at a Meeting Held Under the Auspices of the International Labor Office, Dec. 1-17, 1952. I. C. 7677. 16 pp.

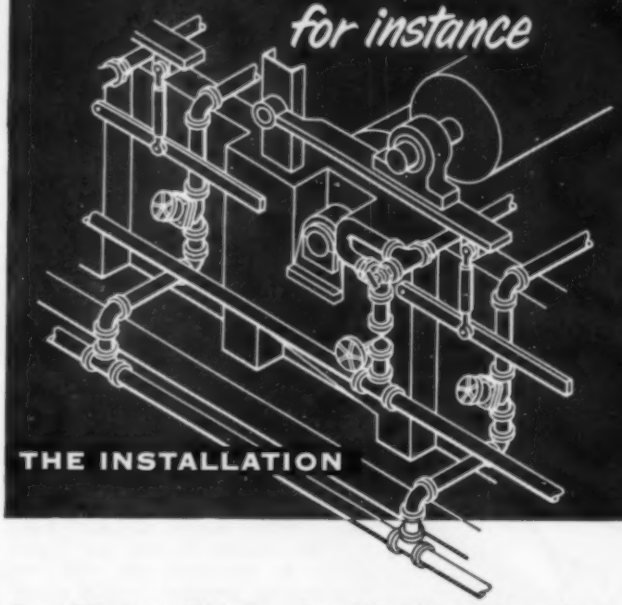
Roof Bolting in Alabama Coal Mines and Iron-Ore Mines. I. C. 7678.

Estimate of Known Recoverable Reserves and the Preparation and Carbonizing Properties of Coking Coal in Putnam County, Tenn., by Lloyd Williams, Robert Lowe, L. A. Turnbull, E. P. Carman, W. L. Crentz, D. A. Reynolds and R. G. Abernethy. 21 pp. R. I. 5029.

Anthracite Launder Screens: Factors in Their Design and Operation, by W. S. Sanner and J. D. Clendenin. 32 pp. R. I. 5032.

Estimate of Known Recoverable Reserves of Coking Coal in Harlan County, Ky., by J. J. Wallace, J. J. Dowd, R. C. Travis, R. F. Abernethy and D. A. Reynolds. R. I. 5037.

Doing What Other Valves Couldn't ...on Slurry Service, for instance



THE INSTALLATION

Crane Diaphragm Valves on slurry-like white water service to cylinder tanks on paper-making machines at Excello Paper Products Co., Inc., Cincinnati.

VALVE SERVICE RATINGS

SUITABILITY:	"Made to Order" for tough jobs
FEATURES:	Seats tight where others fail
MAINTENANCE COST:	None – needs no attention
SERVICE LIFE:	Many times longer than expected
OPERATING RESULT:	Plant efficiency improved
AVAILABILITY:	Crane Catalog item – No. 1610

THE CASE HISTORY

Valves formerly used had been giving much trouble that started between tank fillings. While many replacements were tried, none of the valves could handle the white water solids and fibers that built up in the bonnet and seats between operations. Result was the valves were hard to operate, and leaked at the seats.

Keeping up with valve maintenance and the hazardous, messy floors caused by white water leakage was costly and annoying. But it was a problem that Crane Diaphragm Valves solved handily. The leakage stopped—machine room efficiency went up as the safety hazard was gone—plant appearance improved. Installed about a year ago, Crane Diaphragm Valves keep doing these things without a penny's maintenance cost to date.

THE VALVE

Crane Diaphragm Valves are packless. Bonnet and working parts are sealed to line fluid; there's no place for sediment to build up. Independent disc and diaphragm design saves wear on diaphragm, permits valve to be closed even should diaphragm fail. Pliable disc insert seats tight on foreign particles that cause leakage and wire drawing in ordinary valves. Choose these valves from wide variety of body and trim materials for corrosive, abrasive, and ordinary services. See your Crane Catalog or Crane Representative.

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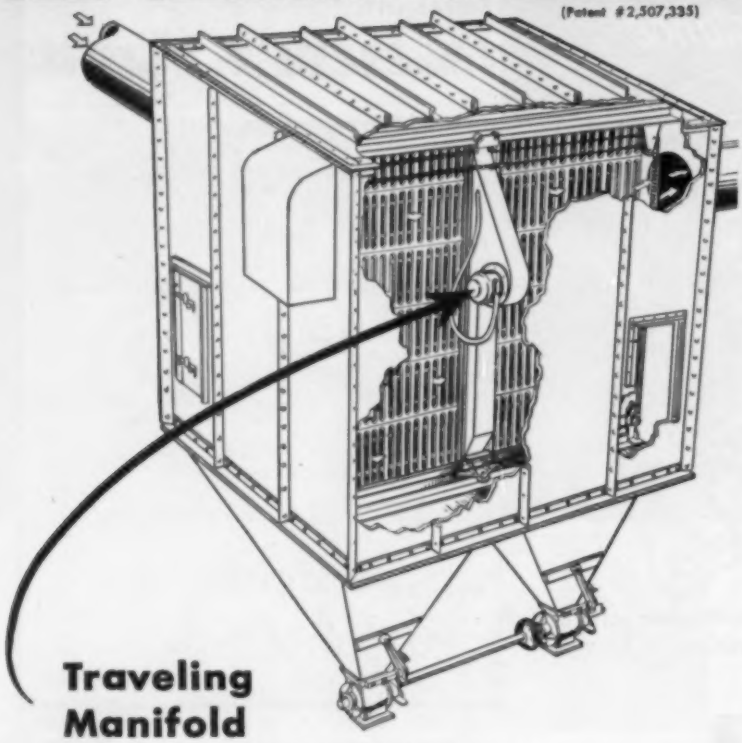

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STOPS THE DUST HOG from stealing profits

PANGBORN'S 50TH ANNIVERSARY • 1904-1954

BCR's Annual Meeting Begins on p 148

cleaner to use and in some instances capable of more efficient use, can coal be converted to liquid or gaseous form to meet competition? What will guarantee preservation of the electric-utility market? How can mining and transportation costs be cut? Is the industry preparing to meet the threat of atomic energy in the electric power field in, say, the next 25 yr? Is coal building up its potential in chemicals through research, or is coal content to let the chemicals industry do the needed research? Compared with nearly 2,000 companies that employ 96,000 research engineers and scientists and spend an average of 2% of gross sales for research, can coal afford to raise its expenditures to 3c per ton—a sum that nearly would equal the 0.6% spent by the petroleum industry?

TECHNO-SALES CONFERENCE

Supporting research, H. J. Rose, vice president and director of research, BCR—"Everyone here knows that the coal industry is doing only a small fraction of what is needed in the way of market and engineering research, equipment development and modern sales and service that are necessary to hold and expand markets for bituminous coal. The very limited funds provided to BCR permit the undertaking of only a small fraction of the technical activities that the industry urgently needs. We are here today to discuss ways and means of getting the most out of what is being done and to get suggestions for future BCR activities."

The Campbell stoker, J. W. Tieman, research engineer, BCR—The Campbell stoker is an improved bin-feed, clinker-type, automatic-ignition underfeed stoker for residential heating with bituminous coal. BCR tested it at the request of the Market Promotion Committee of National Coal Association. Seven coals were used in the tests: Pocahontas No. 4, Elkhorn from eastern Kentucky, Lower Cedar Grove from West Virginia, Southern Illinois No. 5, Pittsburgh from northern West Virginia, Indiana No. 5 and Middle Kittanning from Ohio. Test results indicate satisfactory performance with most stoker coals sold today for home use. Laboratory tests reveal no basic structural weaknesses. Tests of automatic ignition show that large quantities of fines in the retort decrease the reliability of ignition but that reliability can be obtained by use of auxiliary air and by increasing the igniter "on" time.

Residential, agricultural and small commercial markets, J. R. Garvey—See BCR Meeting, above.

Coal use on the farm, T. O. Lawler, manager, crop dryer sales, BCR—In the past year, BCR Products, Inc., a BCR subsidiary, has sold 10 crop dryers near Columbus, Ohio. These installations confirm the fact that the crop dryer is practicable, economical and safe, that it has farmer acceptance and that it pays for

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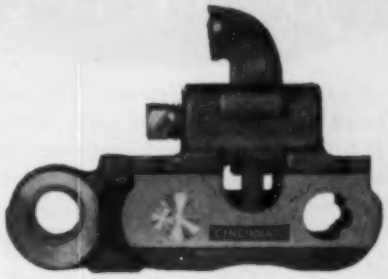
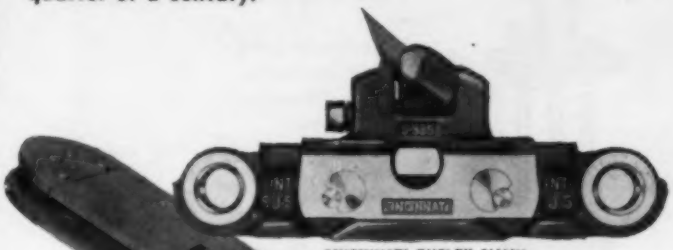


BIT BLOCK WITH CINIDE BIT FOR JOY CONTINUOUS MINER (Ripper Head Type)



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TOP PERFORMANCE of Cincinnati Coal Cutting Equipment year after year in Mine after Mine in this country and abroad has built more new business and more repeat business than anything we might say. We want to take this opportunity, however, to point out that Cincinnati Coal Cutting Equipment is well engineered and ruggedly constructed . . . that it uses less power . . . increases production . . . provides larger cuttings . . . and decreases machine maintenance costs. Summarizing expressions from our customers, the Cincinnati Chain is virtually trouble-free and is popular with management, machine runners and maintenance men.

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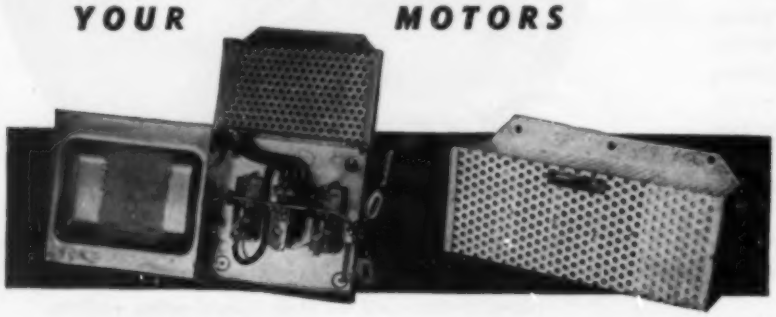

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itself quickly. It has been used successfully on hay, hybrid seed corn and ear corn. Hay-drying costs average $1.15 per ton; corn-drying costs, from 2 to 3.5c per bushel.

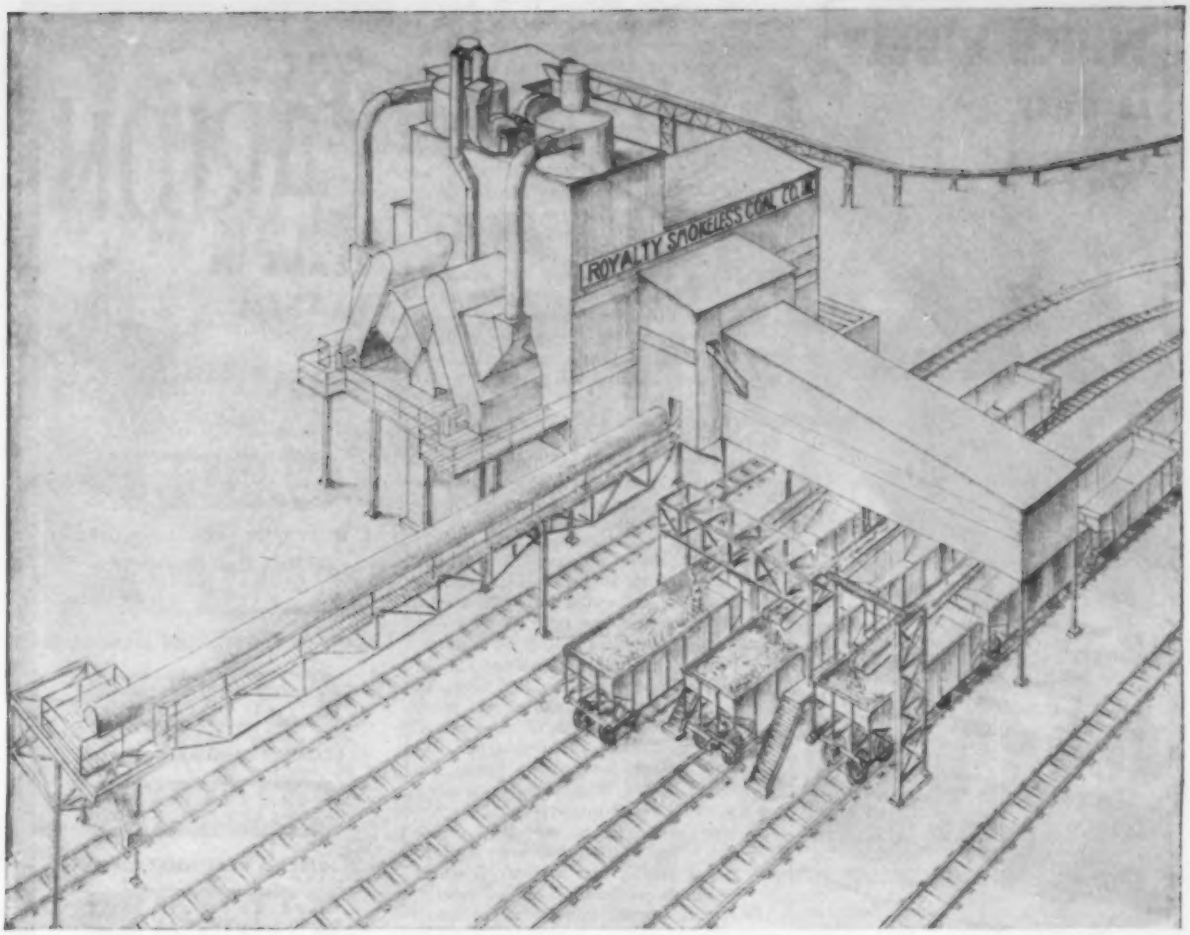
Research opportunities for home and small commercial uses, E. C. Payne, consulting engineer, Pittsburgh Consolidation Coal Co.—Relative acceptability of the several types of fuel-burning equipment for homes and commercial and small industrial installations can be measured by the following yardsticks:

1. First cost.
2. Operating cost: power and maintenance.
3. Equipment service.
4. Fuel availability.
5. Fuel uniformity.
6. Fuel cost.
7. Convenience: fuel delivery and ash disposal.
8. Safety.
9. Comfort.
10. Attention.
11. Cleanliness.
12. Sales solicitation.

Oil and gas stand up well against these yardsticks. Obsolete handfired coal equipment is satisfactory in only two or three respects. Coal can compete with oil and gas only in the degree that burning equipment improves. For this improvement, the industry and its customers must look to the hopper stoker, the bin-feed stoker with automatic ash removal, the smokeless magazine furnace, the Fire Jet burner and, for small commercial and industrial installations, the pulverized-coal burner with vacuumatic ash removal and the pre-engineered package burner-boiler unit.

Spreading BCR information, John W. Igoe—BCR's technical information service aims to provide member companies with information about developments in coal research and, by making such information available to coal users, to create a favorable market for coal sales. With this aim, over 200 publications and professional papers have been issued by BCR. These include *Bituminous Coal Research*, a quarterly report summarizing news and developments; BCR "Aid to Industry" brochures, which combine latest research information with experience and judgment of engineers to help coal users ("Economical Operation of the Small Steam Plant," for example); technical and economic studies ("Expansion of Railroad Electrification," for example); and technical papers presented by BCR engineers at professional meetings.

Other information-spreading activities include combustion conferences for small power-plant operators in major cities, regional BCR membership meetings, Techno-Sales conferences like the present one, and news releases concerning BCR research. Even so, the responsibility for using research results to sell coal or to promote the sale of new and improved equipment still rests in the hands of the salesman. There is no one who can do the job for him, or as well as he can.



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- *Location*—Clifftop, West Virginia—a new seam in a previously unmined area of West Virginia
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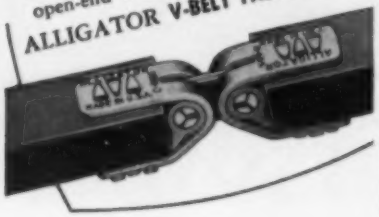

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Coal and the utilities, E. R. Kaiser, with A. B. Clymer, coordination, BCR—Four biggest problems facing the utilities are, in order of importance: air pollution by sulphur dioxide, economical and efficient collection of flyash, slagging and ash deposits in the furnace and superheater, and plugging and deterioration of equipment growing from attempts to cool flue gases and thus increase heat recovery, with resulting condensation of sulphuric acids. Other problems are: lack of uniformity in coal, frozen coal, hanging of coal in chutes and bunkers, tramp iron, sulphur and pyrite.

To help the utilities solve their problems, BCR is developing laboratory methods of treating flue gases to remove sulphur dioxide and flyash from flue gas—methods that may help in the solution of other problems as well; consulting with makers of precipitators; finding profitable market outlets for flyash; handling inquiries on wet-coal handling; and preparing study projects to get at more realistic and efficient solutions.

Collecting dust with spray, L. A. Updegraff, mechanical engineer, BCR—Small plants need a dust-collection system with low first cost and low operating cost—a system that may be called on only at soot-blowing or fire-cleaning time. Simple water sprays have been installed in stacks with good results, though some plant operators fear the effect of cool water on the stack lining. In existing installations, no reasons have been found for complaint. More information is needed on the efficiency of this type of collector, the type of nozzle to use, the correct pressure to use in the nozzles, what to do in case of acidity and how much water to use for a particular type of nozzle. The trend toward conversion of small industrial boilers to dustless fuels could be slowed down by a practicable type of spray collector.

Automatic coal-fired steam generators, P. O. Kock, steam power engineer, BCR—BCR has developed a design for a small package-type burner-boiler unit that is simple to operate and fits readily into a small floor space. Aim is a coal-fired unit to compete with popular oil- and gas-fired package boilers. The experimental design has a capacity of 2,250 to 3,000 lb of steam per hour. Boiler heating surface capacity is 358 sq ft, which is maximum size permitted in Ohio without a licensed attendant. The unit will burn a wide variety of bituminous coals without significant clinkering and will operate well within the code limitation of dust discharge without the use of dust collectors. Retail cost probably will range between $8,000 and $9,000.

Combustion conferences, C. H. Marks, development engineer, BCR—Combustion conferences provide an educational service to coal users. In these conferences, 29 of which have been held involving a total audience of 2,062 engineers and coal users, qualified coal men present prepared and illustrated talks on smoke control, flue-dust control and coal- and ash-handling. Additional subjects soon will be added to the

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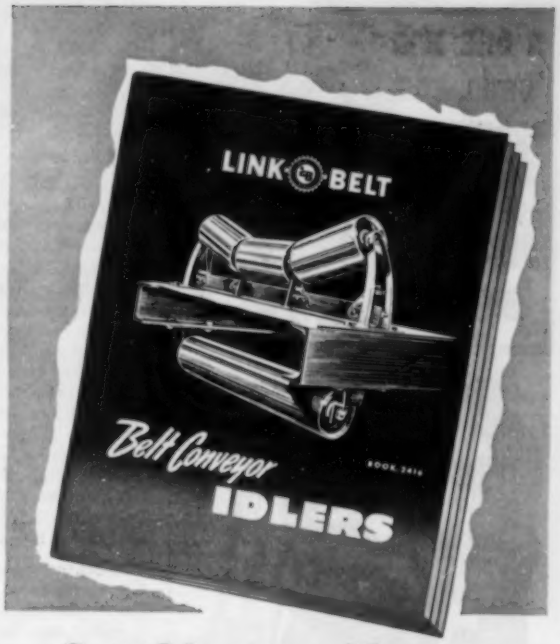

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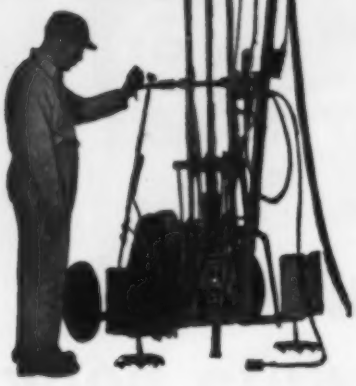

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curriculum. To conduct the sessions, BCR now has available 49 fuel engineers, most of whom represent 26 BCR member companies in the eastern United States, the Midwest, the South and Canada. A side benefit of the conferences has been closer contact between coal-company fuel engineers and BCR engineers.

Significance of projects on power and industrial uses, E. D. Benton, director of research, Ohio Coal Association—Combustion conferences, development of the stack spray and automatic steam generators and research for power generation are substantial advances. The fact remains, however, that BCR sponsors who get most for their money are the ones who give time and effort to the various projects and follow up the information and know-how gained through research. Closer and more frequent contact is needed between salesmen and engineers, since the latter can explain to salesmen how new tools and advanced knowledge in utilization and design will be helpful to customers.

What research means to industry, G. B. Carson, dean of engineering, Ohio State University—Research means searching for a better solution to a problem, a welcoming attitude when the solution is clear and a vigorous pursuit of the successful application of the idea after the concept is clear. Research pays off only when its practical results are put to use. If, for instance, the coal industry over the past 25 yr had engaged in research on steam locomotives and railroad problems, it might have found the answers to problems that led to displacement of the steam locomotive by the diesel. Those problems are locomotive availability, range, cost and performance, plus roadbed attrition.

Using research results to sell coal, W. W. Bayfield, executive vice president, American Coal Sales Association—The two missing elements needed for better coal sales are market research and sales promotion. The industry has not provided market research to tell technical research what to do. The industry also has failed to provide a sales promotion organization adequately financed, competently managed and staffed, and guided by a carefully conceived plan to market the results of technical research. Market research must go to the consumer to find out what he wants and what he dislikes about coal, and then take the facts to engineers and technical researchers. The sales promotion organization—probably regional at first and nation-wide later—must be staffed by competent merchandising men and sales engineers, carefully recruited and trained. Upon sales promotion men falls the task of bringing architects, consulting engineers and coal customers face to face with the results of research.

Studying gas producers, E. R. Kaiser—Four accomplishments of BCR's gas-producer study program are: (1) a single-cylinder diesel engine operated smoothly and developed power commensurate with calorific input of producer gas at the Niagara Falls plant, International Graphite & Electrode Co.; (2) a Wellman-

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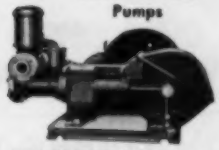

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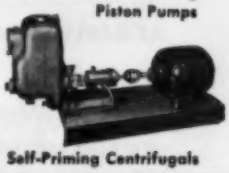

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Galusha gas producer ran satisfactorily on caking coal at Niagara Falls; (3) a two-zone gas producer with a coal-decaking feature has been investigated; and (4) a study has been made of the present economics of gas producers. General conclusion is that though progress has been made, the competitive situation now is unfavorable to development of gas producers by the bituminous industry. Some revival of gas producers may be practicable in the future.

Chemical and process uses of coal, Dr. H. J. Rose—For 9 yr, BCR has sponsored basic research at Carnegie Institute of Technology, covering such subjects as carbonization, gasification combustion, hydrogenation, oxidation, etc. Sponsorship now has been cut off because of inadequate support of BCR by the coal industry. Even so, BCR keeps itself and the industry informed on world-wide research, continues to answer questions about coal utilization and economics from large chemical and other manufacturers, seeks out hard-to-find facts about coal characteristics and test methods to guide member companies and coal users, provides data on research developments for financial analysts, develops uses for waste products and supports a research fellowship at Mellon Institute. Soon, BCR will release a comprehensive report on the uses of coal and coke in the chemical, metallurgical and other process industries. This report will include data on carbonization, gasification, chemical synthesis, combustion products, metallurgical uses, electrothermy, hydrogenation, controlled oxidation, solvent extraction, carbon products and uses for residual products.

Making money from residual products, H. H. Russell, development engineer, BCR—Finding profitable uses for flyash avoids the cost and nuisance of flyash disposal and provides a credit that lowers the cost of coal. In replacing part of the portland cement in concrete, flyash provides improved workability, high ultimate strength, low hydration heat and good water resistance. It also is an excellent filler for bituminous materials. A demonstration strip of concrete highway with flyash ingredient near Pittsburgh has stood up well, and a survey of potential in 14 Appalachian states indicates a highway-construction market for nearly 15,000,000 tons of flyash for use in surface and binder courses and as "choker" in base courses. Dams, concrete masonry and other products also offer large uses for flyash. Mining and washery operations provide shale from which several coal companies now are producing lightweight aggregate, with the promise of considerable savings in building costs. Finally, coal fines are beginning to find use in plastics and molded products.

Progress in gasification, carbonization and chemical uses, John Mitchell, director of research, Eastern Gas & Fuel Associates—BCR research in gasification, carbonization and chemical uses of coal should be integrated with studies of all other workers in these fields. Progress in gasification has been reported, for example, by American Gas Association, the Bureau of Mines, Carnegie Institute of Technology, Pittsburgh Consolidation Coal Co. and researchers in France, England and Germany. In carbonization, studies are under way or have been completed by Illinois State Geological Survey, the Koppers Co., the Bureau of Mines, state universities of Montana, Wyoming, Kentucky and Maryland, Northwestern University, Pittsburgh Consolidation Coal Co., Alabama Power Co., American Iron & Steel Institute and American Coke & Coal Chemicals Institute, as well as by interests in England, France and Germany. No startling information has been revealed by studies of chemical uses but activity in this field is extensive among universities and other institutions. To keep abreast of developments and to integrate studies, it probably would be desirable for BCR to employ and assign one man on a full-time basis to survey the work done by others in these fields.

How market research helps, John W. Igoe—See "Market Research," BCR Meeting, above.

Advances on the coal-fired gas-turbine locomotive, John I. Yellott and P. R. Broadley, Locomotive Development Committee, BCR—LDC has accumulated 2,182 hr of operating experience with full-scale direct-fired coal-burning gas turbines. The 1953-54 program, in which American Locomotive Co. joined, involved problems of coal supply and ash-separator development as well as turbine

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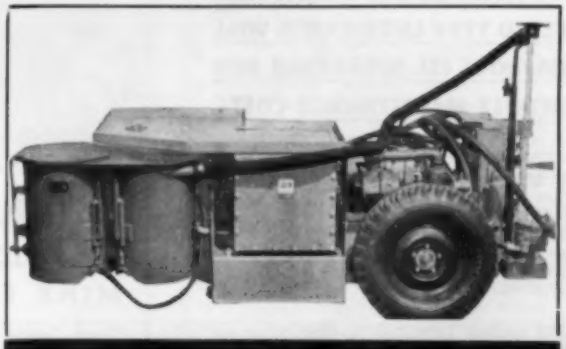

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tests. Under this program, a 750-hr test showed that the 4,250-hp turbine could carry full load and run as smoothly on coal as on oil. Coal-feeding and pumping equipment did an adequate job and the combustors functioned satisfactorily. But flyash equipment did not measure up to requirements and excessive blade erosion took place. Forthcoming tests will show whether new Multitube separators with Mark III Dunlab tubes will protect blades adequately. Assuming an average speed of 21 mph for freight locomotives, fuel consumption per mile at 50% load factor for a three-unit 4,500-hp diesel will be about 6.6 gal at a cost of 69c; a gas-turbine locomotive without regenerator, 150 lb of coal at a cost of about 52c. For an annual mileage of 84,000 mi, fuel-oil bill for the diesel would be $58,500; coal bill for the gas turbine, $35,000.

Progress and opportunities in mining research, Stephen Krickovic, chief engineer, Eastern Gas & Fuel Associates—BCR's Mining Development Committee has experimentally completed four major projects: a continuous mining machine, continuous face transportation, section illumination and roof-bolting indicators.

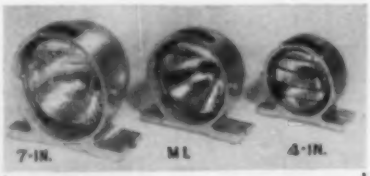
The continuous miner offers real savings in mining costs. Even so, there is room for improvement in the performance of existing machines from the standpoints of coal-breaking principle, maneuverability, maintenance and adaptation of mining projections to eliminate dead work and minimize moves. The LeRoi Co., Cleveland, which purchased the BCR Test Unit No. 2, along with certain rights, in May will begin test trials of a machine developed from the BCR prototype. The miner will work in seams 38 to 52 in thick and will have the following specifications: length, 27 ft; tramming width, 9 ft; weight, 34 tons; turning radius, 36 ft; six rotating heads; width of cut, 17 ft; tramming speed, 40 fpm; two 100-hp motors; 280 bearings of only 28 different sizes; 100% grease lubrication. Remote control will permit the operator to stand behind the machine and along the rib.

Continuous face transportation can nearly double the performance of a continuous miner. Joy Mfg. Co. in 1951 purchased rights to a BCR-developed extensible shaker conveyor and has developed it further. The program now is in abeyance because the coal industry as a whole does not now favor shaker conveyors.

Face illumination, worked out with the cooperation of Mine Safety Appliances Co. and with help from General Electric Co., American Steel & Wire Co. and Pittsburgh Consolidation Coal Co., promises to provide more effective supervision, better roof inspection, greater safety in shuttle-car operation, better maintenance, less loss of materials, improved housekeeping and, in particular, lower-cost maintenance of shuttle-car trailing cables. Present tasks are to develop a lamp and connections suitable for gaseous mines and to experiment with the system in a non-gaseous seam of middle thickness.

Since excessive bolt tension can cause breakage and loss of material, MDC has sought a low-cost way of measuring correct roof-bolt tension that would be more accurate than a torque wrench. The solution is based on the fact that scale on a steel plate of a certain thickness will flake off in a definite pattern when the plate is bent. Using a 6 x 6 x ⅜-in steel plate, dip-coated with a special paint, investigators found that flaking was readily discernible and was in keeping with the expected pattern. With a plate of this thickness, it now is possible to load the bolt with the recommended tension regardless of the torque. For a thinner plate, the flaking pattern would change and new values would have to be determined for it.

Supporting mining research, Gerald von Stroh, director of development, Mining Development Committee, BCR—Between 1948 and 1950, BCR-MDC supporters provided a total of $559,546 for research and development to be carried on until Sept. 1, 1952. Helped by revenues of $113,488 from developments, MDC has been able to extend this program over 6 yr instead of the contemplated 4 yr. Royalties from the BCR-LeRoi continuous miner and from BCR-LeRoi rotary cutter bits probably will bring additional revenues to MDC. Future MDC projects include further development of continuous-mining systems, improvements in roof-control systems and methods and further developments like the recently-announced portable surge car and tandem flexible conveyor. Present funds are adequate to carry the program until Sept. 1, 1954. Before that time, the industry will be given opportunity to subscribe to the extended program.



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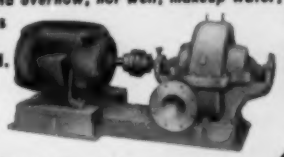

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Our Colleges and Universities Face Grave Financial Problems

For the past decade the nation's colleges and universities have been caught in a destructive financial squeeze. It is particularly destructive for the independent, privately endowed institutions. Unless extraordinary measures are taken to relieve this squeeze, it promises to become progressively worse. To let it do that is to court a national disaster.

This is the first of two editorials devoted to the financial plight of our colleges and universities. This first editorial deals with the character of the problem, present and potential. The second will indicate some things that need to be done about it, and particularly what American business might do.

Enrollment Soars, Income Lags

In broad outline, the financial problem that afflicts our colleges and universities is simple. The demand for their services has increased rapidly, and promises to keep on increasing even more rapidly. At the same time, their financial capacity to provide these services has lagged behind, primarily because of price inflation.

Between 1940 and 1950, college and university enrollment increased from approximately 1⅓ million to 2⅓ million—about 75 per cent. Over the same period, the educational income of these institutions, measured in terms of its actual purchasing power, increased only about 64 per cent. Thus, at the end of the decade, our colleges and universities as a group had, on the average, about 6 per cent less to spend per student than they had at the beginning. Meanwhile, the rapid advance of science and technology had made a good college or university course a much more expensive operation than it was in 1940. Since 1950, the latest date for which comprehensive figures are available, the financial squeeze on our colleges and universities has intensified, largely because of another wave of price inflation touched off by the Korean War.

Among the colleges and universities, the independent, privately endowed institutions are particularly hard pressed. In terms of actual purchasing power, the independent liberal arts colleges are now spending at least 20 per cent less per student than they spent in 1940. Public institutions of higher learning, supported out of tax revenues, have managed to increase slightly their expenditure per student. Otherwise, the financial squeeze on higher education as a whole would be even more severe.

Why Independent Colleges Are Hit Hardest

The principal reason why the independent colleges and universities are so hard up is the shrinkage in their income from endowments. These endowments, created in other days by gifts of generous benefactors to help pay the expenses of higher education, have been hit hard from two directions. During the war and post-war years, the tax collector took so large a part of the incomes and estates of wealthy people that this source of endowments has been greatly reduced. Over the same period price inflation cut in half the purchasing power of the income derived from existing endowments. In 1940 income from endowments provided 26 per cent of the total income of the independent colleges and universities. By 1950 it provided only 14 per cent. The figure is still lower today.

The financial plight of the independent colleges and universities is directly reflected in the salary status of their teaching staffs. In mid-1952 a national survey showed that, after adjustment for the increased cost of living, the salaries of those holding full professorial rank in these institutions were 12 per cent lower than they were in 1941-42. Junior teachers, with the rank of instructor, fared somewhat better. In terms of actual purchasing power, their salaries declined only 2 per cent over the 12-year period, largely because there is more direct competition for their services from industry. Over the same period, the real wages of industrial workers increased 55 per cent.

Time Will Not Provide a Cure

The plight of the colleges and universities, which is shared in some degree by all parts of our educational system, is not one that can be left to time for a cure. On the contrary, the financial problems of our institutions of higher learning will be intensified in the years ahead by the pressure of rapidly increasing enrollments. Present prospects indicate that during the next decade college and university enrollment will increase by about one-third, or from 2⅓ million to over 3 million. The problem of increased enrollments will become particularly acute toward the end of this decade when the babies born during the great surge of population in World War II are ready to enter college.

Such an increase in population as that now in prospect can be a tremendous asset to the nation. It is still a truth, even though it is worn a bit thin by frequent repetition at commencement exercises, that a nation has no resource more valuable than the education of its people. And the better the education, the more valuable the asset.

But to realize this, our colleges and universities must have the financial strength to handle the increased enrollments that face them in the years ahead. This means that we must relieve our independent colleges and universities, in particular, from the financial squeeze in which they are now caught and make them full partners in the economic well-being of the nation. Some of the means by which American business might help achieve this will be discussed in a second editorial.

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1—Model 4500 Manitowoc Dragline with 120 ft. Boom and 6 yard Bucket
3—Euclid Trucks, 15 Ton end dump
3—D8 Caterpillar Tractors complete with Bulldozers
2—TD 24 International Tractors complete with Bulldozers
2—LP Scrapers
1—20 Yard Wooldridge Scraper
All of above equipment is in first class condition and available at once

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NEW and REBUILT STORAGE BATTERY

LOCOMOTIVES

1¾ to 10 Tons 18" to 56½" Track Gauge.
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Greensburg, Pa.

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FOR SALE

2—1,250 Ft. Pcs. 1-⅝" Roebling Locked Smooth Coil Track Strand Wire Rope for Aerial Tramway. NEW—NEVER USED. Apply to THE SNAP CREEK COAL COMPANY, P.O. Box No. 1029, or Tel. 1533, Logan, West Virginia.

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New and used.
The Ironton Engine Company
Farmingdale, New Jersey

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Bucket Loader, 80' lift, now handling pulverized coal, 40 tons per hour, (Practically new).
Conveyor Belt, up to 36", also troughing & return idlers.

ARNOLD HUGHES COMPANY
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New "Searchlight" Advertisements

received by May 18th will appear in the June issue subject to limitation of space available. Address copy to the Classified Ad Division

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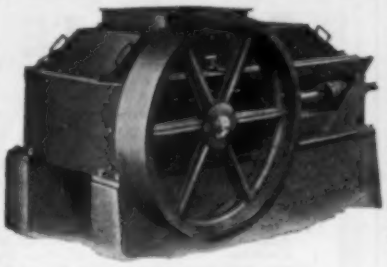
330 W. 42nd St., New York 36, N. Y.



COAL CRUSHERS

1—18" x 18" Jeffrey single roll
1—24" x 24" Jeffrey single roll
1—24" x 36" McNally-Pittsburg double roll
1—36" x 42" double roll
1—30" x 16" Williams pulverizer
1—36" x 48" Jeffrey hammermill

TUGGER & SLUSHER HOISTS

1—5 HP Brownie room hoist
1—5 HP Sullivan RH room hoist
1—7½ HP Sullivan double drum slusher hoist
2—10 HP Sullivan 3 drum slusher hoist
1—Ingersoll-Rand mod. 6HC air tugger hoist
2—6½ HP Sullivan tuggers, 250 v. DC
7—6¼ HP Sullivan double drum, 250 v. DC
1—10 HP Sullivan double drum driven by Continental gasoline engine

BOX CAR LOADERS

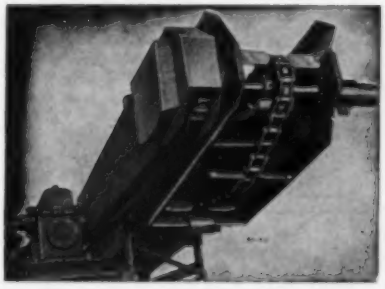
3—Ottumwa 20 HP box car loaders
2—Manierre 22 HP box car loaders
1—Jeffrey 20 HP box car loader
2—Red Devil portable loaders, 12'x15"
1—Card portable loader, 11'x19"

SCRAPER CONVEYORS

1—Link Belt, 50' centers, 12" flights
1—Jeffrey, 75' centers, 9" flights
1—Jeffrey, 67' centers, 30" flights
1—Jeffrey, 70' centers, 30" flights
1—Jeffrey, 72' centers, 30" flights
1—Jeffrey, 88' centers, 36" flights
1—Jeffrey drag, 28' centers, 9" drags
1—Jeffrey drag, 26' centers, 30" drags

ROTARY DUMPER

1—Card rotary car dumper, 13'x5' platform

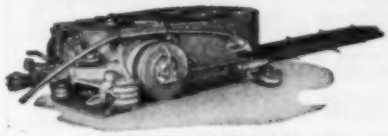


ELECTRIC HOISTS

1—11 HP Vulcan #0 single drum
1—20 HP Vulcan single drum
1—22 HP Vulcan double drum
1—25 HP Vulcan single drum
1—30 HP Vulcan single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
4—100 HP Box single drum
1—112 HP Vulcan single drum
1—145 HP Vulcan single drum
2—150 HP Vulcan single drum
1—375 HP Box Single Drum Hoist, 800 FPM with 375 HP GE Slipring Motor, 575 RPM, complete with controller, grids and magnetic contact panel.
1—600 HP Box Single Drum Hoist, 25,000# Rope Pull, 900 FPM, Hydraulic Post Breaks with 600 HP Westinghouse Slipring Motor, 435 RPM, controls and magnetic contact panel.

LOADERS & CONVEYORS

1—8BU Joy loader
1—61EW Jeffrey elevating chain conveyors
1—61HG Jeffrey chain conveyor, 90'
1—61W Jeffrey chain conveyor, 200'
9—G-20 Goodman shaker conveyors
6—G-15 Goodman shaker conveyors
8—Vulcan shaker conveyors
2—Joy ladel UN-17 shaker conveyors
10—Goodman HA duckbills



MINING MACHINES

2—7B Sullivan super short wall coal cutters
18—CE7 Sullivan coal cutters
1—CR3 Sullivan coal cutter
1—Jeffrey 28A coal cutter
6—Goodman 112-A coal cutter
1—Sullivan CH-11 ironclad shearing machine
1—Jeffrey 29-C Arcwall coal cutter

SCALES

3—100 ton Fairbanks railroad scales
1—100 ton Howe railroad scale
1—125 ton Howe railroad scale
1—5000# Fairbanks Tipple scale with weighing basket
1—5000# Howe Tipple scale

SCREENS

5—3'x5' Tyler "Hummer" electric vibrating screen
1—42"x72" Jeffrey-Traylor electric vibrating screen
1—48"x84" Jeffrey-Traylor electric vibrating screen
1—40"x100" Tyler-Niagara 2 deck shaking screen
2—4'x12' Tyler Ty-rock 3 deck shaking screen
1—2 deck shaking screen, 18'x86"
1—4 deck shaking screen, 32'x84"

PIT CARS

125—60 cu. ft. Card steel coal mine cars 36" ga.
88—66 cu. ft. Card steel coal mine cars 36" ga.

SHUTTLE CARS

2—Joy Shuttle Cars, Model 42D5.

RAIL

We have in stock good relaying rail, 16# to 90# also new 16# to 20# with fittings.

STORAGE BINS

2—50 ton capacity steel bins

CAGES AND HEAD SHEAVES

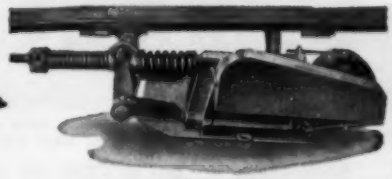
2—Card automatic self-dumping cages, 5'4" x 9'6" platform
2—108" Card bicycle sheave wheels
2—96" wood filled sheaves
2—84" Card bicycle sheave wheels
3—72" bicycle sheave wheels

MINE FANS & BLOWERS

2—8-H Jeffrey 42" Aerodyne fans
1—7' Jeffrey Aerovane 2 stage fan
2—Jeffrey #61 exhaust blowers
7—Jeffrey Aerodyne midget blowers
1—2600 cfm Brown-Fayro exhaust blower
2—3000 cfm Claridge exhaust blowers

PICKING TABLES

1—Link-Belt, 20' centers, 18" pans
1—Card, 41'6" centers, 30" pans
1—Card, 51' centers, 48" pans
1—73' centers, 30" pans
1—64' centers, 48" pans



ELEVATORS

1—Link-Belt, 42' centers, 6"x4" buckets, single chain, complete with steel housing
1—Link-Belt, 36' centers, 18"x8" buckets, double chain
1—12' centers, 14"x7" buckets on belt
1—35' centers, 10"x5" buckets on belt

BELT CONVEYORS

1—Jeffrey 24"x13'
1—Barber-Greene, 24"x66'
1—Barber-Greene, 24"x135'
1—Barber-Grene, 30"x173'

LOCOMOTIVES

1—2 ton Whitcomb, battery, 24" ga.
2—2½-3½ ton Mancha battery, 24" ga.
1—4 ton Westinghouse-Baldwin battery, 24" ga.
1—4 ton Ironton, battery, 36" ga.
2—7 ton G.E. permissible battery, 36" ga.
1—7 ton Atlas, battery, 36" ga.
3—8 ton Ironton battery, 36" ga.
2—8 ton G.E. battery, 36" ga.
2—8 ton Goodman battery, 36" ga.
4—10 ton Atlas battery, 36" ga.
1—3 ton Whitcomb gas engine driven, 24" ga.
1—2½ ton Jeffrey trolley, 36" ga.
1—4½ ton Goodman trolley, 36" ga.
1—5 ton Jeffrey trolley, 36" ga.
1—6 ton Goodman trolley, 36" ga.

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Several 200 KW and 300 KW late type G.E. and Allis-Chalmers Syn. Rotary Converters

200 KW and 300 KW Motor Generator Sets

300—Sanford-Day 42" TG all Steel Rotary Dump Mine Cars, 14" Timken bearing wheels, 4-ton capacity, new in 1948, cost $900.00 each. Offering them for $225.00 each. Also practically new Roberts and Schaefer Rotary Mine Car Dump, push button controls for these Cars.

Several late type Goodman 360, 250 V Loading Machines; 29-LE Jeffrey Cutting Machines; 512-EJH, 250 V, permissible type Goodman Cutting Machines, complete with hydraulic controls and bugdusters and Joy T-2-5APE cat trucks and 8½' cutter bars.

1—McNally-Pittsburgh 5-cell Wash Box and
2—Link-Belt 5-cell Wash Boxes, capacity 150 to 350 TPH

5SC, 42E9, 42E15, and 6SC3AE Shuttle Cars with airplane brakes.

Over 200 tons of 6/0 and 4/0 Trolley Wire; 500,000 CM and 1,000,000 CM Insulated Cable: 2/0, 3/0, and 4/0 3-conductor Insulated Wire.

700 tons of 60 pound Rail; 800 tons of 40 pound Relaying Rail

60,000 Bethlehem Steel Company double lug steel tires for 40 pound rail.

Several 29-U 250 V rubber tire mounted Cutting Machines

11—Low type 35-L 250 V permissible type Cutting Machines, 7½' cutter bars, 24,000 and 25,000 series.

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150—Composite cars (end dump)
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1—150 KW Rotary, G. E.
1—200 KW Rotary, G. E.
1—13 Ton Locomotive, G. E.
3—6 Ton Jeffrey Locomotive, Jeffrey
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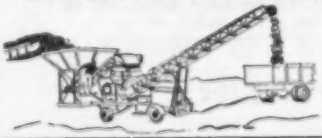

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(1) NEW portable 5 KW gasoline driven generator set. Hercules engine—4 cyl.—30 HP—radiator cooled—electric starting—marine enclosure. GENERATOR: Schramm 5 KW 110 volts DC 45.5 amps.—1750 rpm—serial No. 86N228—Model 5HCD.

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(1) 75 KW WAUKESHA totally enclosed diesel generator set—230 volts—231 amps—ENGINE: 160 HP—Model WAKH—1200 rpm—built-in switchgear and self-contained radiator.

(1) 25 KW—31.3 KVA BUDA diesel generator sets — self-contained. ENGINE: BUDA model 6DTG-468—4½" x 5½"—1200 rpm—radiator cooled. GENERATOR: G.E. 120/208 volts — 3 phase — 60 cycle — 87 amps. — 40 rise — 0.8 P.F. With self-contained switchgear — direct connected exciter. Low hours.

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50 HP C-K-9 Westinghouse Mill motors — 230 volts — 181 amps — priced for quick sale.

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125	West.	11000	2300	3
100	G.E.	2300/4160	230/460	3
75	G.E. (Pyranol)	2400/4160	120/240	3
25	G.E.	2300/4160	230/460	3
50	Allis	2300	115/230	3
50	G.E.	2300	230/460	3
37½	G.E.	11000	230/460	3

MOTOR GENERATOR SETS

600 KW G.E. 275 v. 900R MPC-ATI 2300/4000 v.
400 KW West., 550 v. 720R-Syn.-SK 2300/4000 v.
300 KW West., 275 v. 1200 R-Syn. 2300 v.
300 KW G.E. 275 v. 1200 MPC-ATI 2300/4000 v. Full automatic.
200 KW G.E. 275 v. 1200-MPC-ATI 2300/4000 v.
200 KW Ridg. 275 v. 900R-Syn. 2300 v.
150 KW G.E. 275 v. 1200 R MFC-ATI 2300/4000 v.
100 KW Ridg. 275 v. 1200R-Syn. 2300 v.
50 KW G.E. 275 v. 1200R. MPC-Sq. Cg. 2300/440v.
35 KW.G.E. 125 v. 1750 R. RC-KT 220/440 v.

ROTARY CONVERTERS

2—500 KW G.E. 275 v. HCC6-1200R. 13,200 v.
300 KW G.E. 275 v. HCC6-1200R. 2300/4000 v.
300 KW G.E. 275 v. HC12-800 R. 2200/400 v.
300 KW West. 275 v. 1200 R. 2300/4000 v.

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All types of Joy Cutters, Loaders, Shuttle Cars, Cat Trucks, Belt Conveyors, Chain Conveyors, etc. Includes

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3—14BU low pedestal Loaders, 10 H.P. motors. Type 7AE.
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2—12BU, 9E latest type Loaders.
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1—11BU Joy Loader, hi capacity.
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4—Joy 6SC four wheel drive Shuttle Cars, rebuilt. Elevating discharge.
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G.M.C. & Caterpillar 75 and 100 KW Diesel Plants. 250 DC volts.
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3—Baby Goodman 212AA Cutting Machines.
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2—HGD Hoists, Brown Fayro.
2—MSA Rock Dusters.
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26" Eberhard Shaper, like new.

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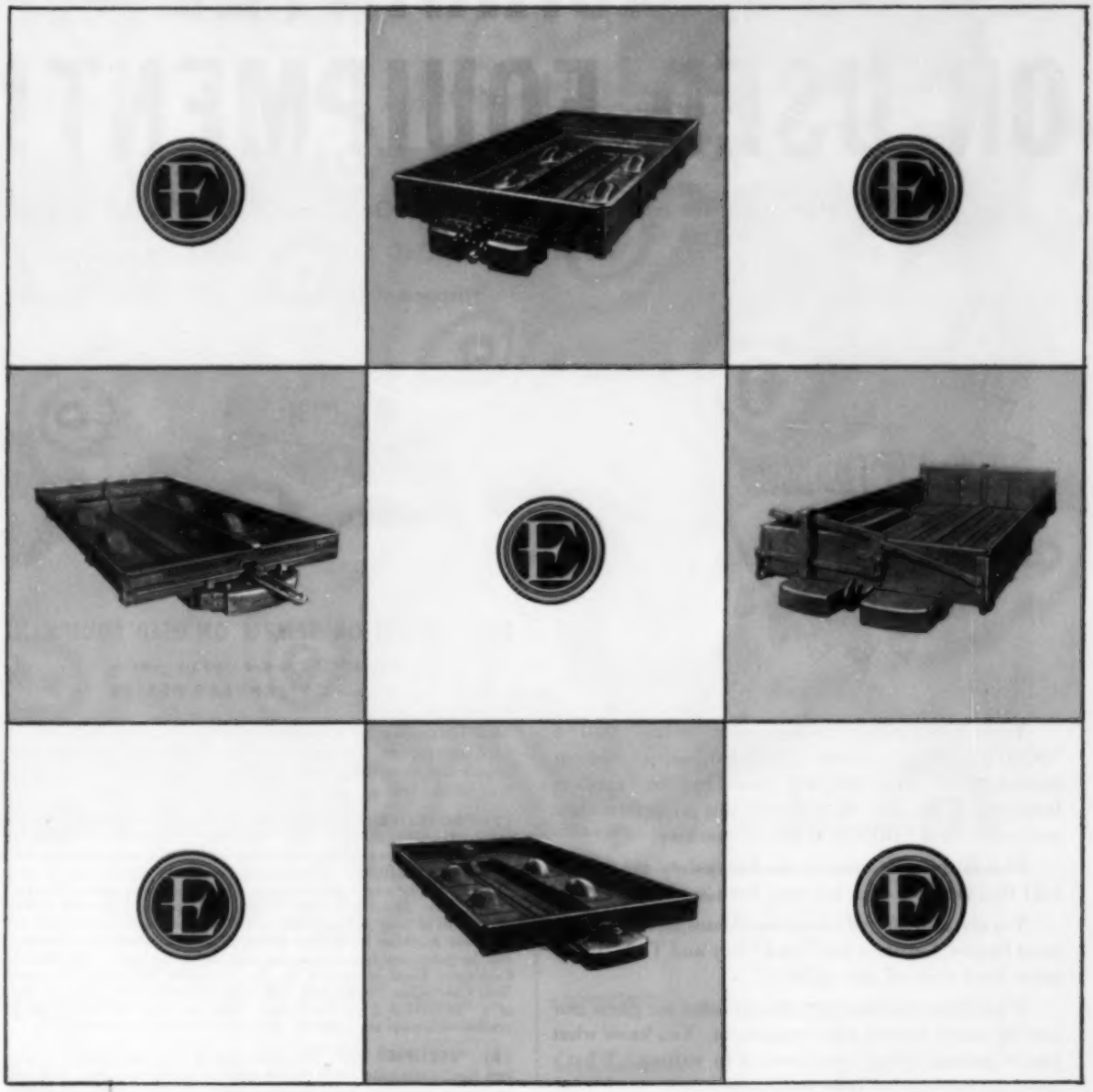
55 YEARS

CUSTOM-ENGINEERED
MINE CARS . . .



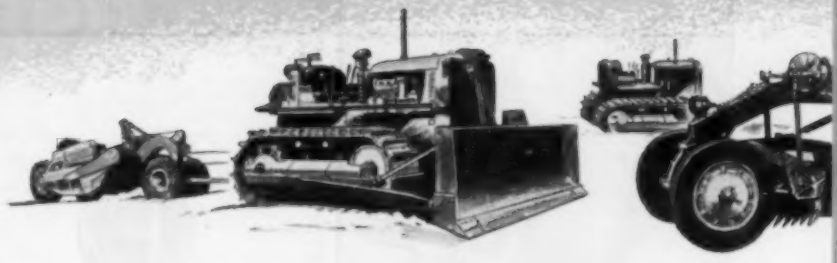
ENTERPRISE

WHEEL AND CAR CORPORATION
BRISTOL, VIRGINIA - TENNESSEE
HUNTINGTON, WEST VIRGINIA

ANNOUNCING A

$10,000 GUARANTEE ON USED EQUIPMENT!

Never before a guarantee like this! Only your CATERPILLAR DEALER offers a "BONDED BUY" on used Caterpillar-built equipment backed by a bond of $10,000.



Your Caterpillar Dealer now offers you a "BONDED BUY" on used Caterpillar-built equipment backed by a bond of $10,000, issued by The Travelers Indemnity Company. He gives you this protection when you purchase a "BONDED BUY" machine.

This is the *first* time in the heavy-duty machinery field that such an offer has ever been made!

You are also offered two other classes of used equipment buys—"Certified Buy" and "Buy and Try." These cover used units of *any* make.

What does this mean to you? *It takes the guess and gamble out of buying used equipment.* You know what you're getting. Your assurance is in writing. What's more, *no matter what your needs, cost-wise or work-wise,* you have a *choice* to meet them.

Only your *Caterpillar Dealer* offers you this across-the-board selection. The best source of new machines, he's also your best source of used machines. Whether you're in the market for one, a few or many, he's the man to see for your *best* buy. See him today for complete details on guaranteed used machines!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

DON'T GUESS OR GAMBLE ON USED EQUIPMENT

You KNOW what you're getting at your CATERPILLAR DEALER

Your Caterpillar Dealer offers you three clear-cut classes of used equipment. He backs each one in writing. You buy with confidence, sure that the equipment is honestly described. See him for the best values on the market!

(1) "BONDED BUY" Only the best in used Caterpillar-built equipment. Each "BONDED BUY" machine is backed by a Dealer's Guarantee Bond equal to the purchase price of the machine up to a maximum of $10,000. This provides a guarantee for thirty days against unsatisfactory performance due to defective parts. If a part should prove defective within the guarantee period under the normal conditions of your job and with proper maintenance, your dealer will put your machine back into operating condition *with no charge to you for parts and labor* up to the amount of the bond. The Dealer's Guarantee Bond is backed by The Travelers Indemnity Company. Your Caterpillar Dealer gives you this protection with your purchase of a "BONDED BUY" machine. Look for the "BONDED BUY" symbol—it's your assurance of the best in used equipment.

(2) "CERTIFIED BUY" Next best buy in used equipment! "Certified Buy" covers machines of any make in good condition. Your performance guarantee is in writing backed by your Caterpillar Dealer.

(3) "BUY AND TRY" Bargains in used machines of any make. Buy and try them for a period mutually agreed upon by you and your Caterpillar Dealer. Each "Buy and Try" machine carries his written "money-back" agreement.

"BONDED BUY" assurance effective in the United States and Canada

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

BEST BUYS IN NEW AND USED EQUIPMENT

Copr. 1954, C. T. Co.

U.S. Rubber belting "takes its lumps" and likes it!

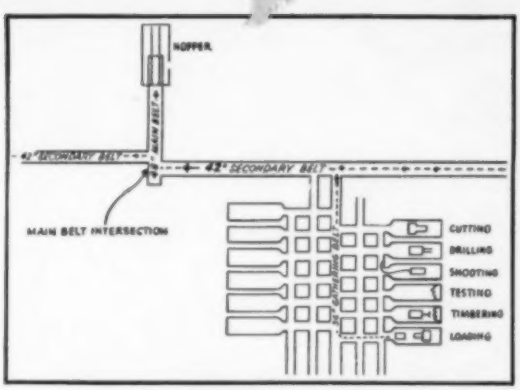
SECTION OF U.S. GIANT® Underground coal belt serving as main haulage belt (below). Coal being loaded from 36" U.S. Giant gathering belt onto 42" U.S. Giant secondary haulage belt.

SCENE:—Mine No. 10 of the Peabody Coal Co., Illinois. Daily capacity, 12,000 tons. For haulage, belting is used exclusively.

PROBLEM: The use of compressed air to break down the coal invariably results in a high percentage of large lumps. The average belt can't take such a beating for long. What to do?

SOLUTION: United States Rubber Company engineers were called in to help in the pioneering and design of the world's most modern underground coal handling system. Using the famous "U.S." Three-way Engineering (in which "U.S." engineers work with the mine operators *and* the designers of the conveyor system) gathering belts, secondary haulage belts, transfer belt and main haulage belt—all made by "U.S."—were installed. These belts stand up easily under the constant battering of the large lumps. Troughability and proper training completely eliminate spillage even at peak loadings as high as 2400 tons per hour.

Take *any* conveyor belt problem—large or small—to "U.S." There are sales engineers at your service at any of our 25 District Sales Offices. "U.S." belting service is also obtainable from any of our selected distributors. Or write address below.



TYPICAL LAYOUT of a room territory and belt system that serves it.

"U.S." Research perfects it • "U.S." Production builds it
U.S. Industry depends on it

US RUBBER

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes
Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

BELT CONVEYOR SYSTEMS, such as this, are but a part of what Link-Belt offers in engineering functions plus equipment units and their components. The broadness of this service means that you have a range of choice, to secure exactly what is needed for your particular job in the preparation and handling of coal. You also draw on an unequalled scope of experience.

Why it pays to use this COMPLETE service

LINK-BELT is your No. 1 source for individual equipment units and their components--or for an entire coal preparation plant

HERE'S the *sure* way to produce more marketable coal at the lowest possible cost per ton. Whether you need an individual component or a complete preparation plant on a "turn-key" basis—Link-Belt is the answer.

Link-Belt builds a broad line of quality equipment. You can choose from three types of washers . . . four types of dryers . . . crushers, screens, car dumpers and shakers . . . every kind of conveying and power transmission machinery.

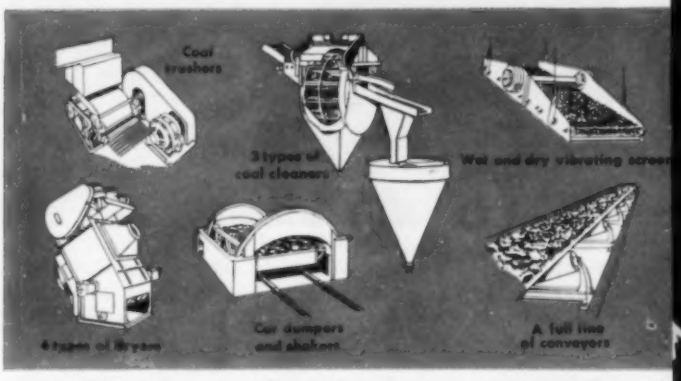
And Link-Belt accepts full responsibility for an entire preparation plant . . . down to the last detail. You have no worries about coordinating the various phases. When you rely on Link-Belt as a single source, Link-Belt accepts responsibility for overall satisfactory performance.

Yes, whatever your needs, call the Link-Belt office near you today. A coal preparation specialist will be glad to analyze your requirements . . . at no obligation, of course.

LINK-BELT

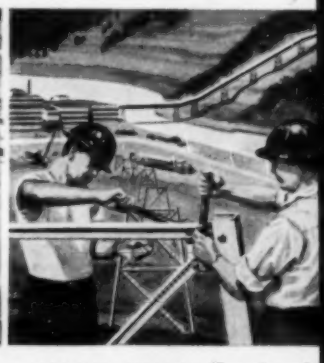
COAL PREPARATION and HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 15, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Wilkes-Barre, Scarboro (Toronto 13), Springs (South Africa). 13.337


Coal crushers
3 types of coal cleaners
Wet and dry vibrating screens
4 types of dryers
Car dumpers and shakers
A full line of conveyors

QUALITY EQUIPMENT. Link-Belt itself builds a broad line of coal preparation, handling and power transmission equipment.

OVERALL ENGINEERING. Vast experience of nation-wide design and field engineering staff integrates all factors, assures expert planning.



COMPLETE ERECTION. Experienced erection superintendents, staffs and skilled crews carry through entire job down to last detail.